

Industrial Ecology • Why Public Radio Isn't • Kill More Trees  
Clowns Up The Amazon • Guns?

No. 77 Winter 1992

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# WHOLE EARTH REVIEW

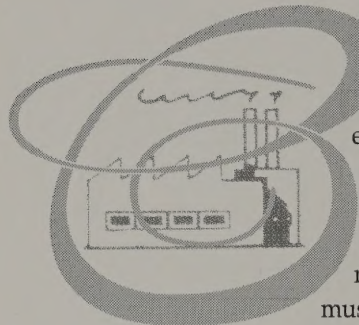
## Biosphere at One <sup>2</sup>

ACCESS TO TOOLS & IDEAS



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**A** GUEST EDITOR usually has a thematic idea for an entire issue and the time to develop it. I was out of town when my mandate was bestowed, returning just in time to sit down at the editor's desk. On the desk was a pile of articles and reviews, mostly written by or brought in by our outrageously eclectic staff and close friends. It's not quite "inmates taking over the asylum" as threatened in the last issue, but the crew as a whole has been more involved than usual in the editorial and production process. Here goes . . .



**C**ORPORATE villainy is so easy to attack: Polluting! Clear-cutting and strip mining! Dolphin murder! They must be stopped!

But all of us — even the most extreme environmental champions — use the products of the corporations we decry. We don't want (most) corporations destroyed, we want them to be good environmental citizens. But they don't know how.

Experience shows that corporate malfeasance rarely derives from malignant intent; it's more often caused by a lack of familiarity with ecological concepts and their long-range importance. A business education usually doesn't include biology. The problem *must* be ignorance, or corporations would already be cleaner and more energy- and resource-efficient. Enlightened (or coerced) companies often find increased profits from pollution prevention (it's always cheaper than cleanup) they once stoutly resisted. Long-ignored energy efficiency turns out to be a moneymaker as well as to reduce ecological degradation.

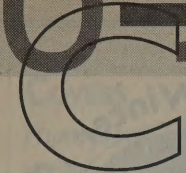
**INDUSTRIAL ECOLOGY** (p. 4) is the best basic guide to improving corporate environmental attitude and performance I've seen. It's written in a language that business folks will accept; it helps environmental workers understand business realities; it should engender cooperation. I'll bet the concept and the term take hold strongly and soon.



Abigail Alling

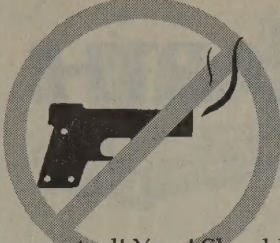
The Biospherians have been getting some hostile media coverage during their first year sequestered in a glassed-in world. Highhanded attempts to control Bio2 news have encouraged accusations of cheating, commercialism, and poor science.

Kevin Kelly wrote an early Biosphere II report as the cover story for *WER* #67 (p. 2). Two years later, in contrast to other reporters, he finds good science, some unexpected phenomena, and a few shenanigans. It's more than ever a Grand Experiment. **Biosphere 2 at One** starts on page 90.



**RIES OF**

Why can't Johnny read? get an answer at last. According to psychologist Renee Fuller, most anyone can learn to read—even a person with an IQ of 20. Dr. Fuller's astonishingly effective methods are almost certainly not the way you were taught — there's no alphabet recitation or complicated phonetics to obfuscate, humiliate and confuse. Instead, her "Ball-Stick-Bird" technique encourages reading for context and concept from the very beginning, taking advantage of the way the human brain is "wired" to acquire, store, recall and utilize information. **THE ASSAYER'S SCALE** begins on page 118.



Gun control! Yow! Should we even bring this up? Yup: remember that this magazine will take on most any topic. So: is gun control desirable or not? Is it even possible? The many sides of this controversy have become so entrenched and politicized that "debate" is euphemistic and any attempt at resolution seems doomed to die in a grim fusillade of howls, sneers, and threats. Agendas remain hidden. People seem to have forgotten the underlying issues, but we haven't — see **Firearms: No Right Is An Island** (p. 40).



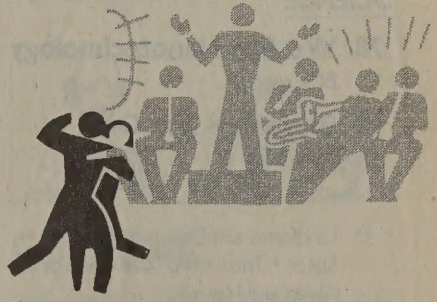
Philip A. Rutter

**F**ind out how to play God, and why, in **KILL MORE TREES; AS FAST AS POSSIBLE** (p. 110). *It sounds bad, but the results are better trees and more intelligent land use. Did you think we were advocating a sequoia clearcut?*

Caetano Scammavino



Clowning their way to health and happiness, a daring traveling carnival is doing a great job of teaching health care and self-respect to illiterate inhabitants of Brazil's rainforests. **Clowns Up The River** is a story of love, hubris, and occasional terror. The show starts on page 26.



**Gonna Have A Good Time** (p. 66) and **Mississippi Plates** (p. 72) give a nostalgic or informative look (depending on your age) at how things went while young white middle-class kids were learning to think about race issues in the fifties and sixties.



# WHOLE EARTH REVIEW

Number 77 Winter 1992



## WHOLE SYSTEMS

### 4 Industrial Ecology

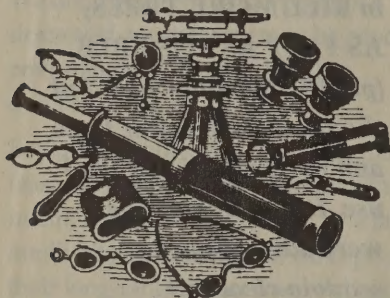
Hardin B. C. Tibbs

### 22 Between Economics & Ecology

Debbie Mytels

24 50 Simple Things Your Business Can Do . . . • The Tightwad Gazette

25 Guide to Commercial Recycling • The Green Business Letter



## SCIENCE

### 78 We Are Nanotechnology

BC Crandall

### 90 Biosphere 2 at One

Kevin Kelly

31 Landforms and Drainage of the 48 States • The United States (except Alaska and Hawaii)

82 Interactive Physics II • Explorabook

83 Surreal Numbers • Fractal Music, Hypercards and More

84 Great White Shark • Ocean Frontiers

85 Understanding the Sky • Orion Telescope Center • Gazing Balls



## COMMUNITY

### 26 Clowns Up the River

(The Amazon's Health & Happiness Project)

Charles L. Johnson

### 32 Diplomacy's Cutting Edge

(The Unrepresented Nations and Peoples Organization)

Jeff Greenwald

### 40 Firearms: No Right Is an Island

Joe McConnell

### 66 We're Gonna Have a Good Time

Marlene Lily

### 72 I Got My Mississippi Plates Today

jd smith

21 The Once & Future Superpower • The Leader as Martial Artist

43 In the Gravest Extreme

46 Giving Up the Gun • Criminal Evidence

48 Women & Guns

76 The Art of Daily Activism • War Tax Resistance

128 The Mismeasure of Women

## LEARNING

### 50 "I Wander the Terrain, Playing Godzilla"

Freddy Bosco

### 118 The Assayer's Scale

Was Intelligence the Ultimate Currency of the Information Age?

Renee Fuller, Ph.D.

20 Ecological Literacy.

81 Ishmael

125 The Mutter Museum  
1993 Calendar • Primitives

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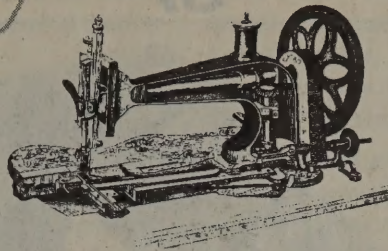
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## COVERS

Front: James Donnelly takes a guess at BioShed 2000.  
Color (natural, naturally) by Kathleen O'Neill.



Back: This shot of a Mississippi orphanage band was taken by the noted Life magazine photographer Otto Hagel in 1938. Used by permission of his equally notable widow and fellow Life photographer Hansel Mieth. —J. Baldwin



## LIVELIHOOD

### 86 The Case Against Patents

*Don Lancaster*

- 77 The Overworked American  
• Sabotage in the American Workplace
- 88 Milwaukee Job Saw  
• Deburring Tool • Enerpac
- 89 On Duty Emergency Tool  
• Magna-Point Tweezer  
• Storm Whistle
- 124 The Buckskinner's Craft  
• Sell Yourself to Science
- 128 Feminine Ingenuity

## LAND USE

### 108 GrassScaping

*Malcolm Wells*

### 110 Kill More Trees; As Fast As Possible

*Philip A. Rutter*

- 39 Finding & Buying  
Your Place in the Country
- 106 Sailor Song • PrairyEarth
- 107 Voice of the Earth
- 109 Lancaster & Simpson • Drip Irrigation



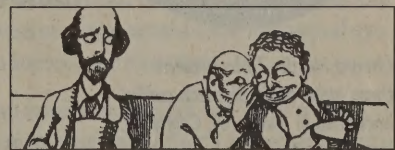
## NOMADICS

- 31 Samba
- 37 Discover Indian Reservations USA  
• Indian America • Just Go!
- 38 Undiscovered Islands of the Mediterranean
- 39 The Traveller's Tree
- 116 Used Cars • Lease Cars
- 117 Mountain Bike!  
• Road Rash • Cool Tool



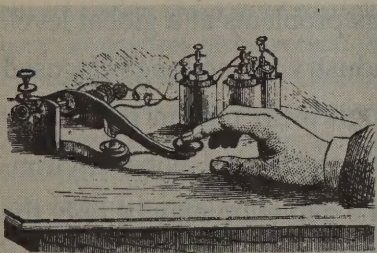
## HEALTH

- 126 Diet for a New America  
• May All Be Fed • Relief From Back Pain • Nada-Chair
- 127 EarthSave Foundation • Dyna-Bee • Gyrobic-I
- 129 Falling Apart



## GATE 5 ROAD

- 130 Gossip • Think Globally, Dance Locally
- 131 The Fluctuating Price of Tea in China
- 132 Backscatter
- 135 1992 Financial Report
- 136 Supporting Subscribers
- 137 Statement of Ownership • Masthead
- 138 Unclassifieds
- 141 Reader Services
- 142 Whole Earth Bookstore



## COMMUNICATIONS

- 52 Why Public Radio Isn't  
*Rachel Anne Goodman*
- 58 Access to Independent Video  
*Richard Kadrey*
- 61 Zines 'R' Us  
*Richard Kadrey*
- 64 When a Bookstore Becomes a Library  
*Clerc Englemert*

- 49 The Age of Missing Information  
• Harriet the Spy
- 123 Animal Talk

# Industrial Ecology:

## An Environmental Agenda for Industry



Arthur D. Little, Inc.



OPERATING ON A GLOBAL SCALE brings problems at a global level. The environmental issues now facing industry are no longer focused simply on local toxic impacts — although these remain potentially serious. There are now unintended effects on the total global environment, of which global warming and ozone depletion may be only the most visible of a multitude of adverse symptoms.

*I heard Hardin Tibbs present these ideas at the Ecotech conference held in Monterey, California, last November. To me, his was the most exciting paper presented by a representative of industry (the management and technology consulting firm of Arthur D. Little, Inc.). Stewart Brand reacted by hiring Mr. Tibbs to work with him in the Global Business Network he cofounded.*

*I expect the concept of Industrial Ecology will inform a lot of the desirable changes that will take place as corporations realize that good environmental citizenship is also good business. It's going to go something like this. —J. Baldwin*

BY  
**HARDIN**  
**B. C. TIBBS**

The emerging environmental challenge requires a technical and management approach capable of addressing problems of global scope. By contrast, the environmental agenda of companies today is frequently driven by a list of individual issues because there is no accepted overall framework to shape comprehensive programs.

Corporate environmental agendas typically list goals such as eliminating the use of chlorofluorocarbons, promoting recycling, increasing energy efficiency, and minimizing the production of hazardous waste. The question is whether this kind of action list goes far enough in dealing with underlying causes, or whether it is largely treating symptoms. Will it protect business against further "environmental surprises?" In its complexity, the global environmental problem-set somewhat resembles an iceberg — well-publicized environmental problems are the visible one-tenth above the surface. We still know too little about the adaptive capacity of the

natural environment as a whole to predict confidently how it will react to continuing industrialization. If the iceberg suddenly rolls over, it could expose problems that the average business is quite unprepared for.

Effective defense against this uncertainty will be based on the recognition of a key principle. The ultimate driver of the global environmental crisis is industrialization, which means significant, systemic industrial change will be unavoidable if society is to eliminate the root causes of environmental damage. The resulting program of business change will have to be based in a far-sighted conceptual framework if it is to ensure the long-term viability of industrialization, and implementation will need to begin soon.

The aim of this article is to introduce and discuss the concept of industrial ecology as the best available candidate for this needed conceptual framework. In essence, industrial ecology involves designing industrial infrastructures as if they were a series of interlocking manmade ecosystems interfacing with the natural global ecosystem. Industrial ecology takes the pattern of the natural environment as a model for solving environmental problems, creating a new paradigm for the industrial system in the process. This is "biomimetic" design on the largest scale, and represents a decisive reorientation from conquering nature — which we have effectively already done — to cooperating with it.

The time is right for the adoption of such an approach. Environmental concern is no longer a fringe preoccupation, but now enjoys broad social recognition and popular support. Government environmental legislation is becoming increasingly stringent, and the media frequently act as environmental proponents in reporting environmental damage. As a result, major companies are beginning to react with what has been called "corporate environmentalism." And this, in turn, is creating the need for a means of orienting strategy, management, and technology in an emerging world of environmentally aware business practice.

## **A conceptual model for systemic change**

The problem of localized environmental impacts has been well understood for many years, and industry and regulatory authorities have evolved procedures for minimizing classic environmental problems such as local emission of toxic pollutants. But the scale of industrial production is now so great that even normally nontoxic emissions, like carbon dioxide, have become a serious threat to the global ecosystem. Seen in its broadest terms, the problem for our industrial system is that it is steadily growing larger in comparison with the natural environment, so that its outputs are reaching levels that are damaging because of their sheer volume, regardless of whether they are traditional pollutants or not. The relative scale of the industrial system is remarkable: the industrial flows of nitrogen and sulfur are equivalent to or greater than the natural flows, and for metals such as lead, cadmium, zinc, arsenic, mercury, nickel,

and vanadium, the industrial flows are as much as twice the natural flows — and in the case of lead, 18 times greater.<sup>1</sup> The natural environment is a brilliantly ingenious and adaptive system, but there are undoubtedly limits to its ability to absorb vastly increased flows of even naturally abundant chemicals and remain the friendly place we call home.

The scale of industrial production worldwide seems set for inexorable growth. All countries clearly aim to achieve the levels of material prosperity enjoyed in the West, and they intend to do it by industrializing. Since their wish represents market growth to Western companies, and is directly in line with current democratic and economic rhetoric, it seems politically inevitable. Leaving aside environmental concerns, simple equity argues that it is also morally unavoidable. We are witnessing the evolution of a fully industrialized world, with global industrial production, global markets, global telecommunications highways, and global prosperity. This prospect brings the realization that current patterns of industrial production will not be adequate to sustain environmentally safe growth on such a scale and are therefore all but obsolete.

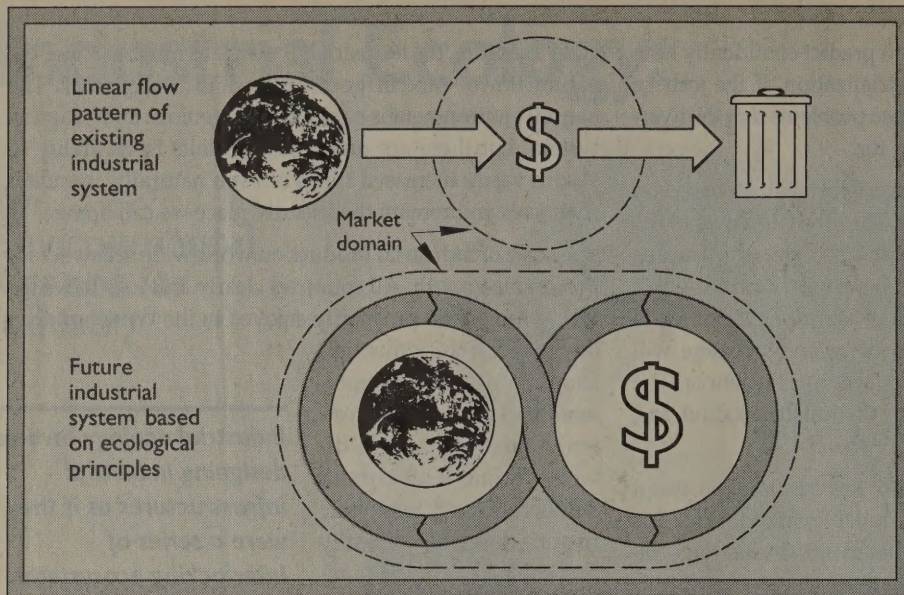
The challenge stems from the fact that we are constructing an artificial global system within a preexisting natural one. It is easy to forget that the industrial system as a whole, as it is now structured, depends on a healthy natural global ecosystem for its functioning. While the industrial system was small, we regarded the natural global ecosystem as limitlessly vast. As a result we treated the functioning of the natural system as irrelevant to our industrial operations. But the continuing expansion of the worldwide industrial system will oblige us to reconsider this view.

The solution will be an approach that allows the two systems to coexist without threatening each other's viability. Nature is the undisputed master of complex systems, and in our design of a global industrial system we could learn much from the way the natural global ecosystem functions. In doing so, we could not only improve the efficiency of industry but also find more acceptable ways of interfacing it with nature. Indeed, the most effective way of doing this is probably to model the systemic design of industry on the systemic design of the natural system. This insight is at the heart of the closely related concepts of industrial ecology, industrial ecosystems, industrial metabolism, and industrial symbiosis, all of which have been emerging in recent years. The question facing industry is to understand how this thinking might function in practice, and what implementation would involve.

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***Industrial ecology involves designing industrial infrastructures as if they were a series of interlocking ecosystems.***

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**Figure 1:**  
Economic value  
generation and  
underlying pattern  
of materials flow

At the moment, the industrial "system" is less a system than a collection of linear flows — drawing materials and fossil energy from nature, processing them for economic value, and dumping the residue back into nature (see Figure 1). This "extract-and-dump" pattern is at the root of our current environmental difficulties. The natural environment works very differently. From its early non-cyclic origins, it has evolved into a truly cyclic system, endlessly circulating and transforming materials, and managing to run almost entirely on ambient solar energy. There is no reason why the international economy could not be reframed along these lines as a continuous cyclic flow of materials requiring a significantly lower level of energy input — and a vastly lower level of raw materials input from, and waste output to, the natural environment. Such a "cyclic economy" would not be limited in terms of the economic activity and growth it could generate, but it *would* be limited in terms of the input of new materials and energy it required.

Many characteristic features of the natural global ecosystem could usefully be emulated by industry:

- In the natural system, there is no such thing as "waste" in the sense of something that cannot be absorbed constructively somewhere else in the system. (For example: carbon dioxide exhaled by animals is absorbed by plants as a "feedstock" for photosynthesis.)
- Life-giving nutrients for one species are derived from the death and decay of another. (Bacteria and fungi in soil break down animal and plant wastes for use by growing plants.)
- Concentrated toxins are not stored or transported in bulk at the system level, but are synthesized and used as needed only by the individuals of a species. (Snake venom is produced in glands immediately behind the snake's teeth.)
- Materials and energy are continually circulated and transformed in extremely elegant ways. The system runs almost entirely on ambient solar energy, and over time has actually

managed to store energy in the form of fossil fuel. (The cycling of nitrogen from the atmosphere into protein and back again to the atmosphere is accomplished by an intricate chain of bacterial, plant and animal metabolism.)

- The natural system is dynamic and information-driven, and the identity of ecosystem players is defined in process terms. (The metabolic and instinctive activity of species is coded in their DNA and shapes much behavior in ecosystems, which can be viewed as systems for transforming chemicals and energy.)
- The system permits independent activity on the part of each individual of a species, yet cooperatively meshes the activity patterns of all species. Cooperation and competition are interlinked, held in balance. (The behavior of species in ecosystems is modified in an interactively choreographed flow of responses to the availability of food, variations in seasonal climate, the immigration of new species, etc. Competition for food resources is often minimized by "timesharing" or niche adaptation.)

The aim of industrial ecology is to interpret and adapt an understanding of the natural system and apply it to the design of the manmade system, in order to achieve a pattern of industrialization that is not only more efficient, but that is intrinsically adjusted to the tolerances and characteristics of the natural system. The emphasis is on forms of technology that work *with* natural systems, not *against* them. An industrial system of this type will have built-in insurance against environmental surprises, because their underlying causes will have been eliminated at the design stage.

Our industrial system ultimately depends on the natural ecosystem because it is embedded within it. Our challenge now is to engineer industrial infrastructures that are good ecological citizens, so that the scale of industrial activity can continue to increase — to meet international demand without running into environmental constraints, or, put another



way, without resulting in a net negative impact on the quality of life.

## The Business Context — “Corporate Environmentalism”

The backdrop to industrial ecology is a history of environmental debate spanning two decades or more. Basic environmental awareness was established by the late 1960s, following publication of books such as Rachel Carson's *Silent Spring*,<sup>2</sup> and began to attract serious academic attention in the 1970s. The application of computer modeling to environmental issues resulted in the *Limits to Growth*<sup>3</sup> study for the Club of Rome, and the *Global 2000 Report*<sup>4</sup> to President Carter, which it inspired in the early 1980s. The essential conclusions of these reports were that unchecked industrial growth would inevitably lead to significant worldwide environmental degradation, and that serious consideration must therefore be given to curtailing industrial growth.

This point of view was not without its critics: the most vocal and cogent of these was probably Herman Kahn, who, in his book *The Resourceful Earth*<sup>5</sup> (WER #45, p. 15), coauthored with Julian Simon, refuted the idea that the earth is as fragile environmentally or as limited in resources as the earlier analyses had assumed. The need for some environmental caution was accepted, but it was argued that the level of public concern was already at a level fully adequate to ensure a corrective business response. Indeed, it was argued, any extra governmental action on the environment — in the form of added regulatory burden — ran the risk of weakening the long-term health of the economy and detracting more from future wealth and quality of life than would the postulated environmental deterioration.

Elements from both poles of the argument appear to be converging into a commitment to action. Industry increasingly accepts the environmental imperative, and has many programs in place to repair the environmental mistakes of the past. Environmental regulations have proliferated to become a mature and formidable body of legislation. The prospect of radical energy efficiency through new technologies has demonstrated that further economic growth may indeed be compatible with environmental stability.

At the same time, as is made clear in the recently published book *Beyond the Limits*,<sup>6</sup> written by the original *Limits to Growth* authors, current levels of industrial throughput are now seriously eating into the environment's ability to replenish natural biological stocks and neutralize pollution. And there is generally acknowledged evidence of serious systemic environmental damage, which only threatens to get worse. In other words, there actually is an environmental problem, and there is general agreement that something needs to be done about it. The difficulty is that environmental debate so far has been focused on making a case for environmentalism, or arguing against it, and has not provided industry with a clear agenda for positive

environmental response.

An effective environmental agenda will be one that industry can align with easily. In contemplating significant change, business needs to be able to find common ground with the program of action being proposed. Business, in keeping with its entrepreneurial roots, is essentially optimistic and forward-looking, with a preference for action and a willingness to accept measured risk. It has a bias toward innovation and a desire for independence and leadership. It also prefers an objective that can be clearly interpreted in management and technical terms, and is compatible with business activity. The ideal agenda should allow progress to be measured, enhance business performance, and be applicable in any industry, permitting alliances and cooperation among corporations and between industries.

Most existing environmental analysis and commentary has not been framed to incorporate these attitudes, but the intent of industrial ecology is to create a common cause between industry and environmentalism. Philosophically, it is based on a set of implicit assertions:

- With appropriate design, industrial activities can be brought into balance with nature, and industrial growth with low environmental impact is possible. As a result, we have the ability to make industrial development sustainable in the long term, but to do so we must actively apply the appropriate policies and technologies.

- Technology itself is simply an expression of fundamental human curiosity and ingenuity. It is no more intrinsically “unnatural” than human beings themselves and would merely be reinvented if we tried to get rid of it. This view affirms both technology and innovation, but introduces the idea that technology can be designed for improved social and environmental yield, since it is shaped by human decisions.

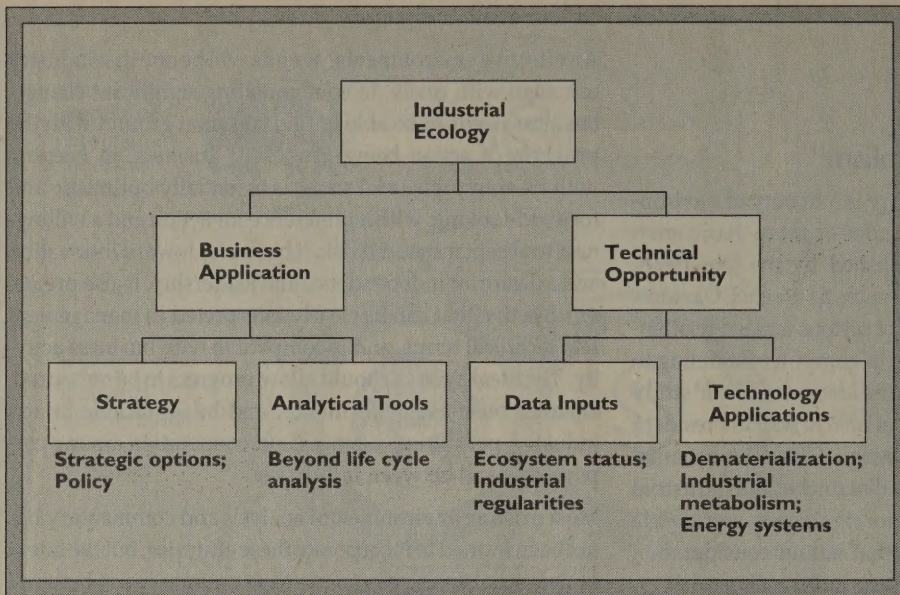
- Today's problems are so complex they can only be solved by the creation of future newness — there is no “way back” to a supposedly better earlier time. For instance, if we chose to stop all use of nuclear power, the simple need to keep existing radioactive waste safe would require that we retain nuclear know-how indefinitely.

The realization that environmental objectives can be compatible with continued technological development and wealth creation is a key element in the continuing evolution of business attitudes toward environmental issues. It comes as companies have been progressively moving from a minimal posture focused on cleaning up past mistakes to a much more active role that seeks to avoid future environmental errors.

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**An effective environmental agenda will be one that industry can align with easily.**

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**Figure 2:** Industrial ecology permits an integrated managerial and technological interpretation

Initially, business had a hard time taking environmentalism seriously, and saw the philosophy underpinning it as passive, regressive, antigrowth, and antitechnology — an attitude that made genuine action on environmental issues almost impossible. In the terminology of strategic planning, the resulting posture was purely reactive. Any environmental action taken was largely in response to the pressure of legislation or public opinion. In its narrowly defined desire to defend the status quo and to remain profitable, the company of yesterday restricted itself to the minimum effort necessary to ensure compliance and end-of-pipeline cleanup. This posture was intrinsically vulnerable to unanticipated risks and unforeseen costs, and suffered from an inability to acknowledge new business opportunities being created by environmental concern.

The emerging “green corporation,” on the other hand, accepts the environmental imperative and willingly assumes the mantle of environmental leadership. It adopts a truly “proactive” strategic posture, favoring voluntary product and process redesign, as well as the avoidance of pollution and waste, and welcoming cooperation and alliances with other organizations. In short, it takes the long-term view and addresses environmental issues by attacking their root causes. This new outlook has been aptly termed “corporate environmentalism,” and is founded on the recognition that environmentalism can be compatible with good business and is essential for business survival.

Industrial ecology gives structure and consistency to emerging corporate environmental conviction. As a framework for environmental strategy, industrial ecology is uniquely able to provide the coordinating vision for effective management planning and technical implementation in tomorrow’s green corporation. It may even evolve into an intellectual platform that will frame public environmental debate. Industrial ecology promises to give industry the power to anticipate risk and opportunity, to provide real environmental leader-

ship, and to engineer lasting solutions to issues of pressing social concern.

### Industrial Ecology in Detail

Applied industrial ecology is an integrated management and technical program (see Figure 2). On the management side, it offers tools for analysis of the interface between industry and the environment, and provides a basis for developing strategic options and policy decisions. The analytical tools go beyond existing Life Cycle Analysis methods to the detailed mapping of existing industrial ecosystems and the patterns of industrial metabolism within industrial processes. These new methods are described in the sections that follow.

On the technical side, industrial ecology offers specific engineering and operational programs for data gathering, technology deployment and product design. The techniques and technologies of real-time environmental monitoring are becoming increasingly sophisticated, and will be integrated using information technology as a practical tool for mapping and managing environmental impacts. Process and product design will reflect industrial-ecology thinking from initial design principles to final decommissioning and disassembly.

Over time, the application of these new tools and techniques will lead to conceptual and practical advances in at least six areas (see Figure 3):

#### 1: The creation of industrial ecosystems

Industrial ecosystems are a logical extension of life-cycle thinking, moving from assessment to implementation. They involve “closing loops” by recycling, making maximum use of recycled materials in new production, optimizing use of materials and embedded energy, minimizing waste generation, and reevaluating “wastes” as raw material for other processes. They also imply more than simple “one-dimen-

sional" recycling of a single material or product — as with, for example, aluminum beverage can recycling. In effect, they represent "multidimensional" recycling, or the creation of complex "food webs" between companies and industries.

A very literal example of this concept is provided by industrial environmental cooperation at the town of Kalundborg, 80 miles west of Copenhagen in Denmark.<sup>7</sup> The cooperation involves an electric-power-generating plant, an oil refinery, a biotechnology production plant, a plasterboard factory, a sulfuric acid producer, cement producers, local agriculture and horticulture, and district heating in Kalundborg (see Figure 4).

In Kalundborg in the early 1980s, Asnaes — the largest coal-fired electricity generating plant in Denmark — began supplying process steam to the Statoil refinery and the Novo Nordisk pharmaceutical plant. Around the same time it began supplying surplus heat to a Kalundborg district heating scheme that has permitted the shutdown of 3,500 domestic oil-burning heating systems. Before this, Asnaes had been condensing the steam and releasing it into the local fjord. Fresh water is scarce in Kalundborg and has to be pumped from lake Tissø, some seven or eight miles away, so water conservation is important. Statoil supplies cooling water and purified waste water to Asnaes, which will soon also use purified waste water from Novo Nordisk.

Gyproc, the wallboard producer, had been buying surplus gas from the refinery since the early 1970s; in 1991 Asnaes began buying all the refinery's remaining surplus gas, saving 30,000 tons of coal a year. This initiative was possible because Statoil began removing the excess sulfur in the gas, to make it cleaner-burning. The removed sulfur is sold to Kemira, which runs a sulfuric-acid plant in Jutland. Asnaes is also moving to desulfurize its smoke, using a process that yields calcium sulfate as a side product. Eighty thousand tons of this a year will be sold to Gyproc as "industrial gypsum" — a substitute for the mined gypsum it currently imports. In addition, fly ash from Asnaes is used for cement-making and roadbuilding.

Asnaes also uses its surplus heat for warming its own

seawater fish farm, which produces 200 tons of trout and turbot a year for the French market. Sludge from the fish farm is used as fertilizer by local farmers. Asnaes has more surplus heat available, and there are plans to use it for a 37-acre horticulture operation under glass. Three hundred thirty thousand tons a year of high-nutrient-value sludge from the fermentation operations at Novo Nordisk are being used as a liquid fertilizer by local farms. This type of sludge is normally regarded as waste, but Novo Nordisk is treating it by adding chalk-lime and holding it at 90°C for an hour to neutralize any remaining microorganisms.

It is significant that none of the examples of cooperation at Kalundborg was specifically required by regulation, and that each exchange or trade is negotiated independently. Some were based strictly on price, while others were based on the installation of infrastructure by one party in exchange for a good price offered by the other. In some cases mandated cleanliness levels, such as the requirement for reduced nitrogen in wastewater, or the removal of sulfur from flue gas, have permitted or stimulated reuse of wastes, and have certainly contributed to a climate in which such cooperation became feasible. The earliest deals were purely economic, but more recent initiatives have been made for largely environmental reasons; it has been found that these can be made to pay, too. At Kalundborg, the pattern of cooperation is described as "industrial symbiosis." But it seems more appropriate to consider it as a pioneering industrial ecosystem, since symbiosis usually refers only to cooperation between two organisms. Most of the Kalundborg exchanges are between geographically close participants — in the case of thermal transfer this is clearly important, as infrastructure costs are a factor. But proximity is not essential: the sulfur and fly ash are supplied to buyers at distant locations.

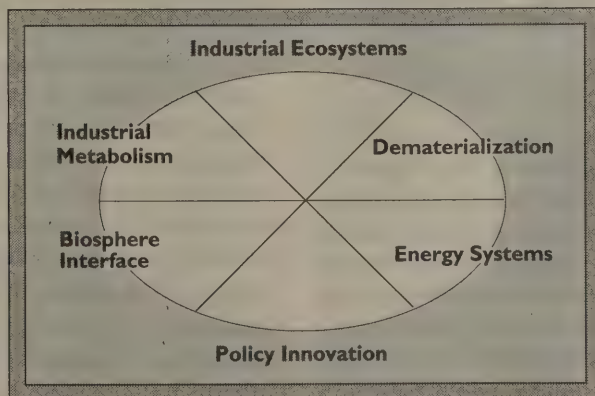
Perhaps the key to creating industrial ecosystems is to reconceptualize wastes as products. This suggests not only the search for ways to reuse waste, but also the active selection of processes with readily reusable waste. This can start with just a single process or waste. As an example, Du Pont used to dispose of hexamethylenimine, a chemical generated during the production of nylon. But when it started looking for alternatives to

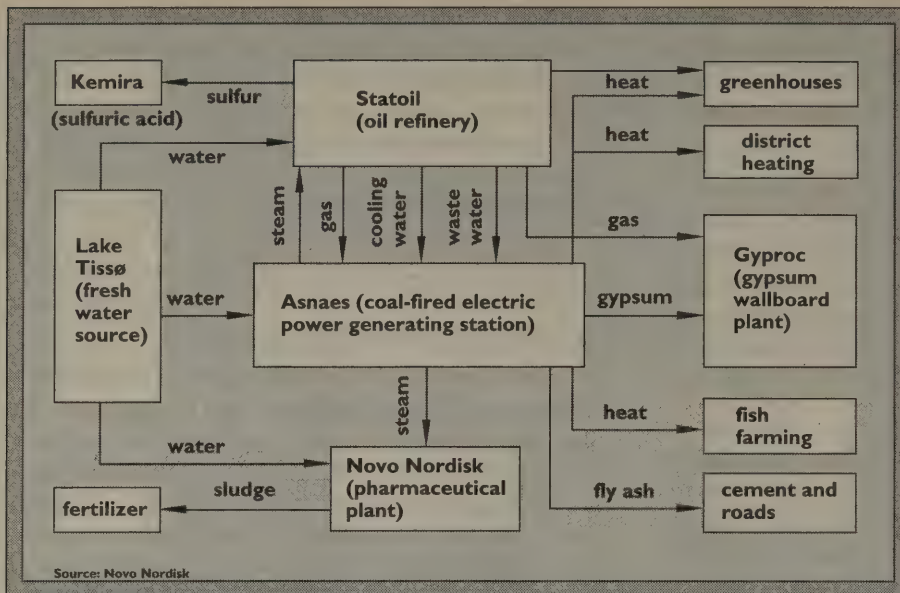
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**The emerging "green corporation" willingly assumes the mantle of environmental leadership.**

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**Figure 3:**  
The principal elements of industrial ecology





**Figure 4:**  
The industrial ecosystem at Kalundborg

disposal, it was able to find a very successful market in the pharmaceutical and coatings industries.

The prospect of a large-scale, ultimately industry-wide, industrial ecosystem has been advanced by Robert Frosch and Nicholas Gallopoulos at General Motors.<sup>8</sup> They have given examples of industrial ecosystems involving individual materials, such as iron and steel, polyvinyl chloride, and platinum group metals. Ironically, until the advent of automotive catalytic converters in the mid-1970s, the platinum-group metals were part of an extremely efficient industrial ecosystem that recycled 85 percent or more of these metals. The high value of platinum was obviously an important factor in this, but the example does indicate that impressive efficiencies can be obtained in practice. And in many cases, apart from the savings in material costs, there can also be substantial savings in hazardous-waste disposal fees.

## 2: Balancing industrial input and output to natural ecosystem capacity

The thrust of industrial ecology is to avoid industrial stress on the environment. There will nevertheless be many points of contact between industry and the environment, and there may be outputs to the natural environment that are, in effect, using it as a carrier or transfer medium, or as a cooperative processing component in the industrial ecosystem.

Industrial ecology will therefore be concerned with management of the interface between industry and the natural environment. This will require an expansion of knowledge about natural ecosystem dynamics on both a local and a global level, detailed understanding of ecosystem assimilative capacity and recovery times, and real-time information about current environmental conditions. It will involve studying ways that industry can safely interface with nature, in terms of location, intensity, and timing, and developing means of continuously adjusting these in response to real-time feedback about environmental conditions. It must

also involve concern about the risk of catastrophic failure of industrial operations, stressing design that is intrinsically incapable of acute environmental impact — much as current design approaches to nuclear fission reactors stress fail-safe cooling principles and low radioactive-fuel-medium concentrations that are immune to meltdown (although these still have not solved the problem of radioactive waste accumulation).

Efforts to establish continuous real-time monitoring of environmental conditions have already begun, as have attempts to weave these together on a global scale, using advanced computer technologies, to create a seamless real-time picture of planetary ecosystem functioning. An awareness of the importance of this can be seen in the GeoSphere Project: the creation of a single database of satellite images that reveal a cloud-free picture of the earth's entire surface — over which an overlay of real-time weather patterns will be created. Similarly, the impact of NASA's graphic images of stratospheric ozone depletion over the Antarctic played a leading role in consolidating political support for CFC restraint. Less well known are the equally remarkable and revealing composite data images from the eight-year life of NASA's Coastal Zone Color Scanner satellite. These remarkable pictures have provided a picture of the seasonal flux of phytoplankton in the world's oceans, with significant gains for scientific understanding of the global carbon cycle.<sup>9</sup> NASA's Upper Atmosphere Research Satellite is expected to provide a similar gain in understanding atmospheric processes. The value of this kind of data has prompted the ambitious "Mission to Planet Earth" proposal by NASA, which would place an array of environmental monitoring satellites in orbit during the 1990s.

A pioneering example of the corporate use of information technology to integrate environmental, technical, and management data is provided by Johnson & Johnson (J&J), the international health-care products manufacturer. Its inno-

vative emergency-management software, "Emergency Information System/Chemicals" (EIS/C), combines three elements: data, communications technology, and an electronic mapping capability that allows the company to show its facilities in detail, down to the floor plans of individual buildings and precise locations of regulated chemicals. It can also access regulatory, chemical, and emergency response data about hazardous materials by drawing on J&J's "PC-Based Regulatory, Environmental, Chemical Information System" (PRECIS).<sup>10</sup>

EIS/C's maps depict not only the J&J facilities and the location of chemicals, but also the surrounding community (the location of schools, hospitals, transportation systems and so on), and can "zoom" out to show the country and its regional location. The system is also capable of collecting local meteorological data in real time, and can use this to plot predicted dispersion plumes of any airborne chemicals, displaying them on the local area maps. During hazardous-chemical emergencies, local authorities often have difficulty pinpointing where the accident has occurred, what other chemicals are stored on site, and other vital information needed for an effective response to the accident. For this reason, J&J has donated the EIS/C software, as well as personal computers or the funds to purchase them, to local emergency management authorities, firefighters and police. In this way, it has prepared both itself and the local communities where it operates for potential chemical emergencies. As of 1991, EIS/C has been pilot-tested at eight sites in New Jersey as well as several sites in Portugal, Belgium, and the UK; it will eventually be used worldwide.

In the future, the large-scale integration of environmental data by computer can be expected to merge specific company and national data, satellite data, and data collected real-time by large numbers of ground-based electronic and biological sensors, to provide a truly global real-time picture of environmental conditions. Sensors are already being used around the world for continuous, unattended environmental monitoring. Solid-state devices use ultrasound to measure wind speed and direction, and temperature; infrared photo-acoustic atmospheric gas sampling devices can continuously and selectively monitor for parts-per-billion traces of toxic or pollutant gas in the atmosphere. "Biochip" sensors based on active biological sensing components are also being introduced.

Obtaining and displaying integrated environmental data will permit the study of global ecosystem behavior, the monitoring of flows or point sources of pollution, and measurement of the effectiveness of interventions. Much, however, depends on our theoretical understanding of natural ecology. Ecology, by no means a mature science, simply does not yet have an adequate large-scale understanding of aggregate ecological processes. In the period 1980 to 1987, 50 percent of all ecological studies were conducted on areas less than one meter in diameter, and 25 percent dealt with areas less than 25 centimeters in diameter. Similarly, a survey of

literature in 1989 showed that 40 percent of ecological experiments lasted for less than a year, and that only seven percent lasted five or more years.<sup>11</sup> A report published in 1990 by the Ecological Society of America, *Sustainable Biosphere Initiative: An Ecological Research Agenda*,<sup>12</sup> emphasizes the need for a wider perspective, and proposes ten priorities for ecological research in response to global environmental problems. It also identifies twelve "intellectual frontiers of ecology" that focus on issues of great importance for management of the interface between industry and the ecosystem.

In ecology today, fundamental aspects of understanding are in ferment. The application of chaos theory, the principles of sociobiology, and even the Gaia theory, are challenging an earlier picture of the stability and evolution of ecosystems. A view is emerging that sees ecosystems as self-organizing systems, in which order and complexity are "emergent" properties, not accidents. As living communities they are able to maintain themselves independently of the precise mix of species that compose them, as these can be in constant flux while the ecosystem itself is sustained.

If ecosystems are "chaotic" systems, they may have the ability to appear robust and resilient until changing overall system inputs reach a level at which there is a sudden jump to a qualitatively different pattern of self-organization. Such changing inputs may include increases in the amount of energy being released in the system, or changes in the identity and amounts of chemicals flowing in the system. Similarly, the "inert" or abiotic part of the natural environment may not be just the coincidental frame in which life finds itself, but the result of active collective regulation by all living organisms. The "strong" version of this view is the Gaia theory, which sees the entire planet as a single living organism.<sup>13</sup> In support of this view, it can be shown that the gas composition of the atmosphere is not chemically stable, that it is being maintained only by the activities of living organisms, and that even the ubiquitous sedimentary crustal rocks are the product of living processes, much as is the shell of a lobster.

Whatever the final form of these ideas, their resolution holds considerable practical significance for environmental management by industry. Rational environmental policies must be based on scientific understanding of environmental processes; if industry is to enjoy rational policy, it has a clear interest in the development of good theory. Many questions with less-than-obvious answers are being generated by new scientific findings and the advance of technology. For ex-

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**Ecology is not a mature science, and does not yet have an adequate large-scale understanding of aggregate ecological processes.**

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ample, as biological elements begin to be used in industrial processes following the advent of biotechnology, where exactly is the boundary between industry and the natural world? Should species be deliberately introduced into natural ecosystems in order to metabolize industrial effluents? Is there any level of industrial output that the environment can tolerate, or must emissions be reduced to zero irrespective of timing or location?

On the last point, prevailing policies stressing pollution control were based on the idea that the environment had an unlimited capacity to assimilate small amounts of pollutants without harm, but findings that this is not true are now leading to a shift in policy to emphasize pollution prevention. Ten states have already passed toxics-use reduction laws modeled on this thinking. But does this mean, by extension, that all individual industrial processes in the future should be closed systems? An industrial ecosystem exploits the transfer of industrial outputs between companies and industries in order to attain efficiencies of use and

reuse. And it is possible to imagine instances in which the natural environment can act as an intermediary or carrier of industrial outputs. For example, a net industrial producer of carbon dioxide (CO<sub>2</sub>) at one location might be balanced by a net industrial absorber of CO<sub>2</sub> at another location, with the atmosphere acting as the link or transfer medium.

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**Specific indicators or indexes could quantify the impact of industrial ecosystems on aspects of the natural environment.**

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This kind of transfer is actually already happening — as the Italian agrochemicals group Ferruzzi has shown by its calculation that it is a net absorber of CO<sub>2</sub>.<sup>14</sup> Finding good answers to questions such as these will have considerable practical significance for industry in the years ahead, and can be expected to be an important aspect of industrial ecology.

Industrial ecology will also be concerned with maintaining rates of natural resource use at sustainable levels and with tolerable environmental impacts. In the case of activities such as mining, the ecological significance of surface rock formations will need to be considered — as with recently emerging concern about the mining of limestone in England, which results in the loss not only of unique habitats and scenery, but also of a very significant water reservoir. The limestone region of the Mendip hills in southern England, which has lost 190 million tons of hard limestone to quarrying in the last twenty years, supplies 90 billion litres of drinking water a year — 40 percent more water per unit area than any other aquifer in southern England.<sup>15</sup> The concept of “renewable mining” — the substitution of, say, volcanic basalt for many mundane uses of sedimentary rock — may yet take hold. However, the mere selection of renewable resources is not enough to avoid significant modifica-

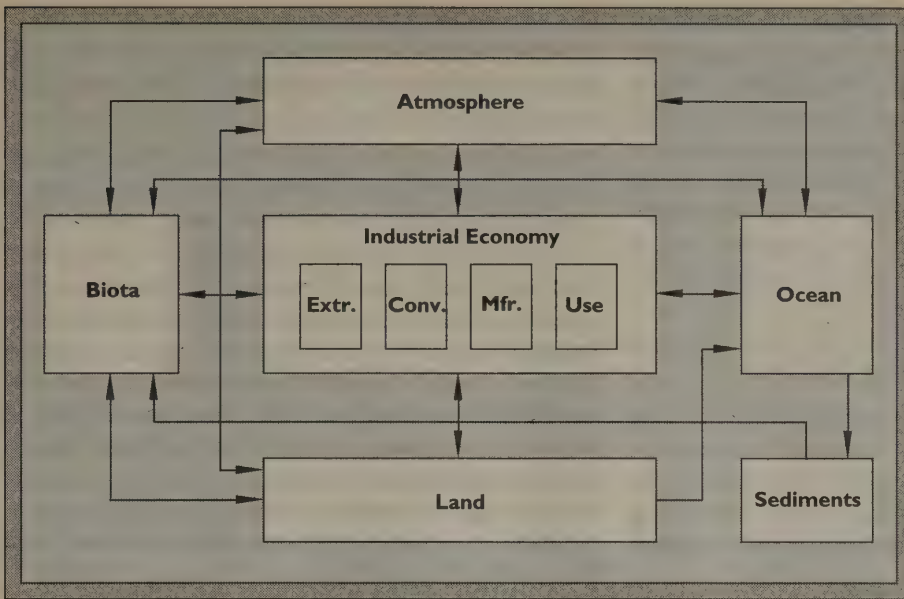
tion of ecosystems. The planting of “factory forests,” for example, where old-growth forests once stood, can lead to a dramatic reduction in species diversity.<sup>16</sup> Clearly, more is needed than the convenience of a single-species monoculture if entire ecosystems are to be sustainably exploited on an industrial scale.

In support of the practical application of ecological understanding, it may prove possible to develop specific indicators or indexes that quantify the impact of industrial ecosystems on aspects of the natural environment. For instance, an industrial facility could be given a score for its net CO<sub>2</sub> balance with the environment; this score could be used to facilitate industry comparisons or the quantification of environmental audits, or to provide a basis for the assessment of a carbon tax. The severity of impact on natural ecosystems might also be assessed by the timescale over which recovery will occur. This depends on which of three recovery mechanisms is called into play. The first, and most rapid, is population regrowth, which occurs when a single species is affected. The second is “succession,” in which many species are affected, and where recovery involves recreation of the entire ecosystem as food chains are rebuilt from the bottom up (a process that can take considerably longer). The third recovery mechanism, with the longest timescale, is evolution — required in cases where human change to the environment is so extreme that recolonization actually requires new organisms.

The flows of chemicals between industry and the biosphere can be mapped using the “mass balance” approach and the concept of “materials cycles.” The mass-balance method uses numerical data for direct inputs of materials, available from economic statistics or individual company records, in combination with chemical or engineering details of the processes being studied. This can give more accurate assessment of waste releases into the environment than direct measurement of waste streams, particularly when the wastes are emitted along with large volumes of combustion products or wastewater.

The concept of “materials cycles” is an extension of the idea of biological cycles, such as the carbon and nitrogen cycles, to include flows within the industrial system. Quantified flow charts of the type shown generically in Figure 5 can be used to integrate a wide array of data, providing a basis for comparing natural and industrial flows, in terms of volumes, flow paths, and environmental sinks. They are an excellent starting point for analysis of the environmental impact of industrial flows, and for the development of environmental improvements and modifications by exploiting potential trade-offs and choices. They can also serve as communication tools for conveying the logic and rationale of complex environmental decisions in an accessible way.

Ultimately, with sufficiently subtle understanding and genuine concern, active management of the industrial interface with the biosphere may become a coordinated effort of environmental monitoring and real-time adjustment com-



**Figure 5:**  
Basic flow diagram  
for the interface  
between industry  
and the environment

parable to the management of large infrastructure networks — such as demand and supply management in electricity grids, or traffic-routing management in national telephone systems.

### 3: Dematerialization of industrial output

Much of the environmental impact of industrial activity is a result of the energy consumption and mobilization of matter that make industrial production possible. In the environmental debate beginning in the 1970s, it was assumed that increases in economic prosperity and further economic growth were inevitably linked with worsened environmental impact. It was therefore argued that economic growth and industrial activity would have to be slowed or reversed in order to solve environmental problems in any fundamental way. Today, this relationship is no longer obvious.

In industrially developed economies, “dematerialization” — a decline in materials and energy intensity in industrial production — is an established trend. When measured in terms of physical quantity per constant dollar of GNP, basic materials use has been falling since the seventies, and has even leveled off when measured in terms of the quantity consumed per capita. Practical examples of this trend are the steadily declining size and increasing power of computers, or the nearly 20 percent drop in the average weight of US automobiles between 1975 and 1985.<sup>17</sup> And microstructural engineering of smart materials is yielding ever lighter, higher-performance components.

The trend toward dematerialization is being driven by at least four factors:

- First, the cost of producing materials has been increasing — largely because materials processing tends to be energy-intensive.
- Second, there is increasing competition from substitute materials, many of which are lighter and have superior

properties to basic materials such as steel. This results in actual substitution of materials with lower mass, or in the introduction of specialty versions of basic materials which give improved performance with less mass for the same function. An example is the increasing use of high-strength steels in automobile manufacture, since each kilogram of high-strength steel replaces 1.3 kilograms of standard carbon steel.<sup>18</sup>

- Third, materials have successively saturated the markets for their bulk use. Just as the major uses of steel and cement have been in the construction of civil infrastructure, which is now essentially complete in industrialized countries, so the market for cars and consumer durables per capita is now also essentially saturated, and consists primarily of replacement demand.
- Fourth, following on the last point, discretionary income now tends to be spent on goods and services with a lower materials content per consumer dollar, since there are no major new consumer product categories with a high materials content per dollar.

The basic trend to dematerialization appears well established, and is clearly environmentally favorable, since it demonstrates that economic growth is becoming increasingly decoupled from growth in materials use — a fundamental issue in the “growth versus environment” debate. In effect, value is increasingly being added by emphasizing product-related information, or embedded knowledge, rather than product mass. Nevertheless, there are a number of factors that run counter to dematerialization, and with which industrial ecology needs to be concerned. The first is product quality. Improvements in product quality generally lead to enhanced dematerialization. But if product quality is poor, although individual product mass may be lower, products are likely to be discarded sooner, leading to increased materialization of waste. Linked with this is the

need for increased provision for repair and recycling of products. The recent emergence of Design for Disassembly (DFD) is a response to the recognition that product design has increasingly emphasized ease of manufacture above ease of repair or recycling. In many cases products are no longer assembled with traditional fasteners such as screws, and cannot be dismantled without destroying their components. In addition, components frequently represent a mix of different materials and cannot easily be recycled. Recent legislation in Germany, mandating the ability to dismantle cars rapidly into homogenous component parts, is likely to lead to widespread development of DFD skills.

At the same time, there needs to be a recognition that although improvements in technology and materials science tend to lead to long-term gains in dematerialization, there may need to be tolerance for transient increases in materialization while a new technology is establishing itself. A case in point would be the major growth in demand for office paper caused by information technology — desktop computers and photocopiers. In spite of the fact that the microchip is perhaps the best example of technology with a dramatically declining ratio of product mass to dollar value, and product mass to embedded knowledge, the “paperless office” has failed to arrive.

Yet the accelerated materialization of paper could be reversed by perhaps three further innovations, each of which the computer industry is striving to develop: an increase in the image resolution of computer displays to just beyond the limit of optical resolution of the human eye (the strategy used in good four-color process printing, but not yet reached even by high-definition television), combined with readily portable large-area displays (transistorized “active matrix” flat-panel displays are moving well in this direction), and

a really convincing permanent memory medium (magneto-optical disks and drives are good potential candidates, since they are impervious to stray magnetic fields). Together, these could make reading from a computer as acceptable as reading from a piece of paper, and could remove the feeling that paper was needed for secure storage.

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***The energy and mass consumed in manufacturing per dollar of product value may come to be an important attribute of new products.***

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Industrial ecology could introduce “materialization impact statements” or an “index of materialization” for products and technologies, to focus the need for additional development effort specifically aimed at enhancing dematerialization. The trend to dematerialization applies not only to materials, but also applies to energy when measured in terms of energy consumed per dollar of GNP. Thus, materialization impact assessments could routinely review the materials- and energy-intensity of products using meas-

ures such as the power consumed in manufacturing per dollar of product value. We may come to regard kWh/\$, or kg/\$, as important attributes of new products we are planning to buy.

An example of a conscious move to energy “dematerialization” is being provided by the recent move by many electricity generating utilities to deal with growing electricity demand in a new way. Utilities in nineteen states have chosen to invest in energy conservation as an alternative to new generating capacity. By offering users energy-saving technology, such as compact fluorescent lamps, and adding a fractional charge to their bills over an extended period, they can continue to show a good return on investment while at the same time meeting demand — without incurring the environmental impact of increased electricity-generating capacity. This demonstrates that with enough ingenuity, profitable operation of a business can be deliberately and successfully decoupled from growth in materialization.

Lastly, industrial ecology would not only seek the deliberate enhancement and acceleration of dematerialization, but also look for ways for newly industrializing economies to leapfrog over older, highly materializing industrial practices to develop intrinsically less environmentally demanding industrial patterns from the outset. By focusing advanced materials and design knowledge on the opportunities for radical dematerialization of basic civil infrastructure, it may prove possible to sidestep the massive materials use that has until now been seen as an intrinsic feature of the early stages of industrialization.

The available evidence suggests that increasing the efficiency of industrialization as an overall development process is feasible, since as different national economies have industrialized their respective peak energy intensities have fallen steadily. When the UK industrialized it was using the equivalent of about 1.02 metric tons of petroleum to yield \$1000 of Gross Domestic Product at its peak intensity in 1880. When US energy intensity peaked in 1915, it was at the equivalent of about 0.95 tons — whereas Japan, one of the more recent countries to industrialize, peaked at only about 0.42 tons in 1950.<sup>19</sup> The average energy intensity of industrialized economies today is about 0.35 tons, but the peak value for economies that are currently industrializing is somewhat higher.

A deliberate effort to develop technologies for dematerialization could provide businesses in industrially developed countries with excellent new markets, while making a crucial contribution to global environmental quality.

#### ***4: Improving the metabolic pathways of industrial processes and materials use***

Industrial metabolism and industrial ecosystems are parallel concepts. The idea of the industrial ecosystem focuses on the efficient interchange of byproducts and intermediates between industrial players, which roughly correspond to the individuals of a species in the biological ecosystem.



Industrial metabolism,<sup>20</sup> on the other hand, is concerned with the efficiency of the metabolic processes occurring within the species' individuals, which roughly correspond to individual firms or industrial process operations. In biology, metabolism refers to the chemical processes and pathways within the living organism by which food is assimilated, complex chemicals are synthesized for maintenance and growth, and energy is stored or released.

Systematic study of the type and pattern of chemical reactions and materials flows in the industrial system indicates a number of potential areas of improvement. Almost all industrial processes are fossil-fueled and often involve high temperatures and pressures. They also tend to involve multiple separate steps, in which the intermediate metabolites are incorporated into the next production stage, or released as wastes, rather than being reused. Reducing the number of process steps can be a powerful means to increased energy efficiency. If a complete process has four steps, each with 60 percent energy-conversion efficiency, the efficiency of the total process is the arithmetical product of the steps: 12 percent. If the process had only three steps, its efficiency would be 21 percent. Deleting process steps is often more feasible than achieving the equivalent incremental improvements in the efficiency of each step.

In addition, many of the end uses of materials are dissipative—that is, they are dispersed into the environment as they are used, with no hope of recovery for recycling.<sup>21</sup> Car and truck brake pads and tires, for example, leave a finely distributed powder on our highways as they wear down. This becomes more serious when toxic heavy metals are involved. Changes in technology could avoid dissipative uses of materials—in the case of car brakes, for example, vehicles could in principle use electrically regenerative or flywheel-storage braking that not only avoids thermally and materially dissipative friction, but actually recaptures the vehicle's energy of motion and stores it for later use.

Compared with the elegance and economy of biological metabolic processes such as photosynthesis, or the citric-acid cycle, most existing industrial processes appear to be far from their potential ultimate efficiency in terms of the basic chemical and energy pathways they use. This suggests that biotechnology may offer the promise of radically improved industrial process pathways, perhaps able to move from primary feedstocks to final products in a single step, while regenerating process intermediates much as the energy carrier adenosine triphosphate is regenerated in cellular metabolism. Biological metabolism is primarily fueled by solar energy and operates at ambient temperatures and pressures: if this were true of industrial metabolism, there could be significant gains in plant operating safety. A simple example of the replacement of a mechanical process by a biological process is the established bacterial processing of metal ore, which has allowed extraction from mine tailings that were previously uneconomic to process further.<sup>22</sup>

Minnesota Mining and Manufacturing Company (3M) pro-

vides an excellent example of the industrial metabolic-improvement approach in practice: its frequently cited "Pollution Prevention Pays" (3P) Program. Initiated in 1975, the 3P Program has resulted in more than 2,700 successful projects in its first fifteen years, while yielding \$500 million in savings for the company and a 50 percent reduction in pollution per unit of production.

Many of 3M's products involve coating processes.

Typically, coatings are dissolved in solvents so that they can be applied evenly and thinly; the solvents are then dried off with heat. The problem is that, as they dry, solvents like toluene, xylene, and methyl ethyl ketone are released into the air. Pollution-control equipment can

reduce these air emissions by as much as 85 percent, but these "add-ons" are expensive to operate and still allow 10 to 15 percent of the solvents to be released. 3P was an attempt to find lower-cost and longer-lasting solutions. Its objective was simple: to prevent pollution at the source in both products and manufacturing processes, rather than removing it from effluent after it has been created.

Although the concept was not unique, even at the time it was instituted, the idea of applying pollution prevention companywide and worldwide, and recording the results, had not been attempted before 3M's initiative. 3P encourages technical innovation to prevent pollution at the source through four methods: product reformulation, process modification, equipment redesign, and resource recovery. Projects that use one of these methods to eliminate or reduce pollution, save resources and money, and advance technology or engineering practice, are eligible for recognition under 3P. In the course of fifteen years, worldwide annual releases of air, water, sludge, and municipal solid waste pollutants from 3M operations has been reduced by half a million tons, with about 95 percent of the reductions coming from US operations.<sup>23</sup>

The ideal end-point of improved industrial metabolism would be advances across the spectrum of industrial processes, bringing them more into line with the metabolic patterns of the natural ecosystem. The creation of industrial ecosystems would be made easier, as would management of the interface between industry and the biosphere. In-process energy demands would be reduced, processes would be safer, and industrial metabolites would be more compatible with natural ecosystems. This is undoubtedly a longer-term objective, but even in the form of modest, systematic process improvements, industrial metabolism has much to offer as a way of thinking about the environmental compatibility of industrial processes, and for this reason is an important component of industrial ecology.

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***Study of the type and pattern of chemical reactions and materials flows in the industrial system indicates potential areas of improvement.***

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### 5: Systemic patterns of energy use

Energy is the lifeblood of industrial activity. The extraction, transportation, processing, and use of energy sources account for the largest environmental impacts of the industrial system. A global, systemic, environmentally oriented approach to energy technology and supply infrastructures is therefore a high priority of industrial ecology.

Existing patterns of energy sourcing and distribution are unsustainable, both in terms of pollution and because they are based on finite fossil-energy resources. Even nuclear fission, viewed over the long term, probably suffers from a low or even negative net energy yield when the total "life cycle" cost of construction, fuel production, decontamination, decommissioning, and waste storage is deducted. Moreover, whenever energy is released in the global ecosystem in excess of the ambient energy load, it amounts to stress that the system has to absorb. The current prospect of global warming illustrates what may happen as a result.

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#### **A systemic approach to energy supply is a high priority of industrial ecology.**

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The use of carbon-containing fossil fuels is at the heart of the problematic release of the "greenhouse gas" CO<sub>2</sub> and a good part of the associated global-warming problem. Every ton of carbon in fuel combines with oxygen in the atmosphere to release 3.66 tons of CO<sub>2</sub>. But the

amount of carbon in fossil fuel varies significantly. Expressed as the proportion of carbon to hydrogen, fuelwood is roughly 91 percent carbon, coal 50 percent, oil 33 percent, and natural gas 20 percent.<sup>24</sup> What is interesting about these ratios is that the fuels used as the industrial system has evolved have become increasingly hydrogen-rich. In fact, in theory at least, pure hydrogen would be the ideal "clean fuel." When it burns, it releases only water vapor as it combines with oxygen in the atmosphere.<sup>25</sup>

This attractive characteristic has led to the concept of a future "hydrogen economy." Although formidable practical development hurdles need to be overcome, this scenario could represent the ultimate environmental energy-supply infrastructure. The hydrogen would be produced from water using heat or electricity, with the energy for this being supplied by solar or hydro power (energy for hydrogen production can also be supplied by fossil fuels or nuclear power, but the total system would then no longer be based on ambient energy). The hydrogen would then be transferred by pipeline to its point of use, acting as a much more efficient energy carrier than electric power grids, and having the advantage that it can be used as fuel by conventional internal-combustion engines. A study conducted in 1989 at Princeton University's Center for Energy and Environmental Studies compared the flammability, energy of ignition, and speed of travel through air of hydrogen, natural gas,

and gasoline, and found that no fuel was inherently safer than the others.<sup>26</sup> The logistics and business infrastructure of a hydrogen-supply industry would appear to resemble those of the existing oil industry; as a result, the scenario is of interest to major oil companies. In Germany, the Federal Ministry of Research and Technology is funding research by Mercedes-Benz into hydrogen-fueled vehicles. In Canada, there are plans to construct a hydroelectric-powered 100-megawatt pilot plant capable of producing two tons of hydrogen an hour. The hydrogen would be shipped to Europe under an agreement with the European Commission.

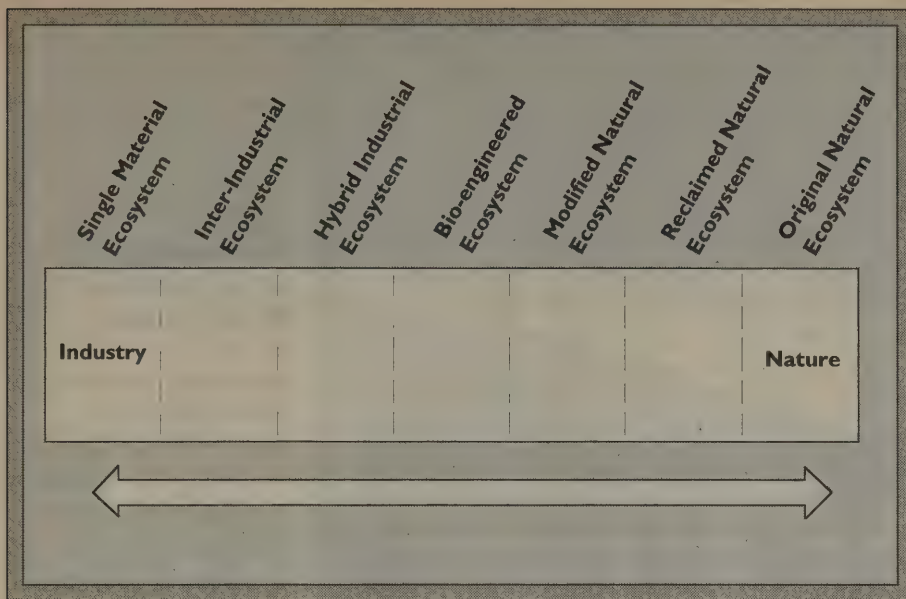
Under this scenario, there would initially be a high energy cost to construct the necessary pipeline, transport, and storage infrastructure, and to manufacture and install long-life ambient-energy capture devices such as photovoltaics or solar thermal collectors. This energy could be provided by fossil fuel in what would amount to a transfer from our energy "capital" account in the earth's crust, to another form of energy supply "capital" — an ambient-energy infrastructure.

This scenario may not represent the final shape of the energy-supply infrastructure of the future, but it does illustrate the systemic thinking that is required. Already, aspects of this logic are being applied. Construction of new electricity-generating capacity around the world is tending to favor highly efficient combined-cycle gas turbine technology that burns natural gas (which is widely seen as the low-carbon "bridge" to a post-fossil-fuel economy). Industrial ecology will be intensely concerned to promote the development of an energy-supply system that functions as a part of the industrial ecosystem, and is free of the negative environmental impacts associated with current patterns of energy use.

### 6: Policy alignment with a long-term perspective of industrial system evolution

As industrial ecology frames a new paradigm for structural balance and environmental optimization in the industrial system, it cannot avoid the inevitable policy dimension of such a broad goal. If it is to achieve its full impact, it will certainly need to be backed up by innovative new policies that coherently align financial, economic, and regulatory scorekeeping on an international basis. A variety of policy issues need to be addressed in order to do this.

Probably the primary policy concern is the resolution of the extensive debate in recent years about the need to reflect the true costs of environmental degradation in market pricing. The tax on CFCs following the Montreal Protocol is clear evidence that, even in the United States, there is a basic willingness to redirect technology for environmental ends. The real question now is what form the full range of these attributed costs will take, when and how they will be applied, and with what degree of consistency across jurisdictions.



**Figure 6:**  
The likely future  
spectrum of  
ecosystem types

It appears inevitable that steps will be taken internationally to place a money price on environmental damage—referred to as a negative “externality” because it is external to economic accounting, and therefore regarded as free of cost by the market. There are at least two basic mechanisms being proposed for this direct transfer of environmental costs into the market domain. The first is the imposition of “green” or “Pigovian” taxes (after the economist Pigou), such as the tax on CFCs. Proposals have been made for a tax of anywhere from \$6 to \$28 per ton on carbon-containing fuels to counter the release of carbon dioxide, and it has been suggested that similar taxes could be applied to environmental issues ranging from the use of virgin rather than recycled materials, to the overpumping of groundwater. Most such proposals recommend that there should be an offsetting reduction in personal and corporate income taxes, or that the revenue stream should be used to fund a transition to an ecologically benign economy.

An alternative approach to the transfer of environmental costs is being proposed by those who say green taxes would simply generate additional bureaucratic inertia. They propose instead that governments should issue a finite number of pollution permits of various types, which could be bought and sold in the market, creating a financial incentive to reduce pollution. To reduce the sum total of pollution over time, the government could issue—or auction—a progressively smaller pool of permits each year, or buy them back from a permanent pool to remove them from the market, as could others (for example, environmental groups). The United States Environmental Protection Agency used this approach during the phaseout of leaded gasoline in the US, and is currently using it in Los Angeles in a program called “emissions trading.” Not only does this program appear to be working within its defined limits, but in 1988 3M voluntarily returned rather than sold 150 tons of air-emission credits, worth more than \$1 million, in order to ensure that

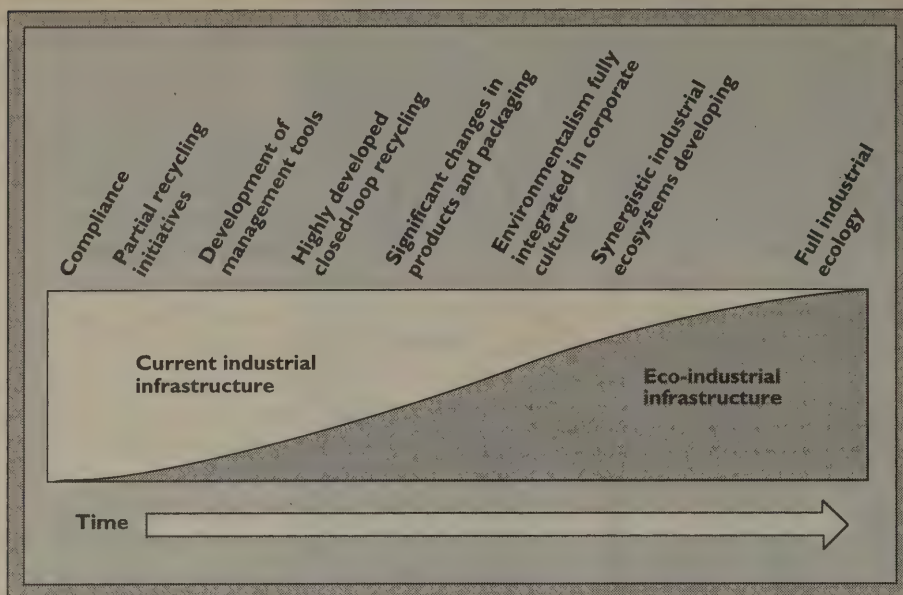
its efforts resulted in a net reduction of air pollution.

Not only does the market not see the “hidden” cost of environmental damage, but it undervalues environmental capital by applying market interest rates when making decisions about the use of natural resources. If a forest growing at 2 or 3 percent a year is compared with a lumber mill that will earn, say, a 15 percent return on investment, the market is likely to sacrifice the forest to feed the mill. As a result, it has been suggested that the discount rates used when making “present value” decisions about environmental assets should reflect natural-growth or ecosystem recovery rates.<sup>27</sup>

The scorecard used to measure the performance of national economies is GNP. Yet this allows no depreciation for depleted or damaged natural resources, and is increasingly coming under fire for being an inadequate measure of national prosperity. A number of alternatives or supplements have been proposed that would provide a more balanced picture. The United Nations Development Program has proposed a supplementary “Human Development Index,” and World Bank economist Herman Daly has calculated an “Index of Sustainable Economic Welfare,” which accounts for a variety of environmental deficits.<sup>28</sup>

On a somewhat different tack, research with historical data indicates that the industrial system as a whole shows evidence of “regularities,” predictably structured patterns of evolution and growth.<sup>29</sup> These regularities essentially show that such things as the emergence of new technologies, or the progressive sophistication of fuel sources, follow consistent and predictable S-shaped curve growth patterns. An awareness of these patterns can have value in ensuring that policy is not swimming upstream against emergent characteristics of the industrial system.

Environmental legislation needs to be both robust, and flexible and experimental in spirit, with a provision for self-



**Figure 7:**  
The emergence  
of an eco-industrial  
infrastructure

correction — attributes that are often difficult to achieve in practice. Sometimes there may be potential for nonlegislative means of policy implementation. An example is the EPA's "Green Lights" program. This involves voluntary "contracts" between the EPA and individual companies that commit them to install advanced, cost-saving lighting fixtures and lamps. The EPA supplies technical and cost information, and, crucially, the motivation for an energy-saving measure which might otherwise not occur simply because it was too low a priority on the corporate agenda.

All these policy options, and others, will benefit by being viewed from the systemic perspective that industrial ecology can provide. It is likely that an analysis based on industrial ecology will prove to be the most effective way both of discriminating between policy options and of achieving an integrated policy platform for the environment.

### Future Developments

The long-run outcome of an industrial-ecology approach can be sketched in outline. In terms of the types of ecosystems that will exist, it is likely that there will be not just one class of industrial ecosystem, but an entire spectrum of ecosystems. These would run from single-material ecosystems, such as the recycling system for aluminum beverage cans, through a variety of more complex industrial ecosystems, and hybrid bioindustrial ecosystems, to original natural ecosystems (see figure 6). For perspective, we should remember that human modification and manipulation of ecosystems is as old as agriculture. The challenge we face now is the need to integrate industry into the equation, and consciously to design a world that is aesthetically pleasing, biologically stable, and economically productive. This is not unprecedented — the "green and pleasant land" of nineteenth- and early twentieth-century England was almost entirely shaped by human activity, as are the ubiquitous (and exquisitely productive) sculpted rice paddies on the

mountain slopes of Java and Bali. The "gardening of the planet" need not be as farfetched as it sounds.

In the future, the scale of our activities is likely to be so great, and arguably is already, that no part of the world will remain entirely "natural." As a result, it will not be possible to define natural ecosystems, or nature itself, simply by referring to "what is out there." We will need to define, along many dimensions, the parameters of what is valuable in a natural system, so that we can monitor and regulate the degree of impact we have on it, and have a basis for restoring it if necessary.

A vision of the environment, or a "target state" for the natural world, will need in part to be expressed in terms of dynamic processes, not only in terms of static ecosystem elements — a mere listing of species. Our picture of an ecosystem tends to be focused on the actors — but it is their actions and the contribution they make that are important to the maintenance of the ecosystem. Ecosystems tend to be in continual flux, with the mix of species changing over time; we will need to recognize this by identifying the values and outputs that are contributed by these dynamic elements.

Another dimension of environmental quality is the recreational and aesthetic value of the natural environment. It is clear that scientific and technical arguments are not the sole driving factors in public concern about environmental issues. People derive high emotional and psychic value from the health and beauty of their environment, and corporations might wonder if they should establish a parallel between this and the care they devote to high aesthetic quality in marketing. One aspect of a company's image may come to be the contribution it makes to shaping its customer's total quality of life — not merely in the products it supplies, but also in ensuring that it does not in the process degrade other aspects of that person's life experience. An example of this would be the brilliant advertisement run by Shell in the UK

a decade ago, showing a shimmering vista of English countryside alongside this headline: "Wouldn't you protest if Shell ran a pipeline through this beautiful countryside?" followed on the next line by "They already have!"<sup>30</sup>

The definition of nature and of environmental quality will not, in short, be something we can take for granted, but something we will have to make a positive effort to formulate. This will be a cultural challenge, as well as a challenge of knowledge and analysis for ecology, but it will be vital to creating an optimal interface between industry and the biosphere. The task of industrial ecology will be to provide the means of maintaining the key defined parameters of the natural environment, allowing the industrial players to collectively "condition" their environment in a manner reminiscent of the Gaia theory.

**Executives and policymakers who absorb and appreciate this new mode of thinking now will be at a very real advantage in the world of the future.**

The result of an industrial ecological approach over time will be a gradual overall transition, taking several decades, to an eco-industrial infrastructure (see figure 7), so that all process systems and equipment, and plant and factory design, will eventually be built to interconnect with industrial ecosystems as a matter of course. Older, "linear flow" concepts of design will be considered obsolete, and a dominant new generation of technology will have come into being, characterized not necessarily by the novelty of its principles, but by its ability

to interlock with other parts of an industrial ecosystem. To a great extent, the industrial leaders of tomorrow will be those who now recognize the conceptual logic of this new approach to technology and invest in the R&D to achieve it.

## Conclusion

The concept of industrial ecology may at first appear impractical or overly idealistic, but it is almost certainly the most plausible model for the industrial-environmental nexus of the future. Individual researchers at organizations as diverse as AT&T Bell Laboratories, Carnegie-Mellon University, Princeton's Center for Energy and Environmental Studies, and General Motors are actively studying or promoting the concept. In addition, major corporations that are environmental leaders are in effect already beginning to put industrial ecology into practice. Its component elements are evident in their policies and practices, even though these companies may not explicitly recognize the concept.

Industry is rapidly moving into an era of new values concerning the environment, in which "corporate environmentalism" will be essential for profitability and business survival. The speed with which a corporation understands and addresses these changing norms and values will define a large part of its competitive edge in the future.<sup>31</sup> The benefit offered by industrial ecology is that it provides a coherent framework for shaping and testing strategic thinking about the entire spectrum of environmental issues confronting industry. Executives and policymakers who take steps to absorb and appreciate this new mode of thinking now will find themselves and their organizations at a very real advantage in the world of the future. ☼

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## Ecological Literacy

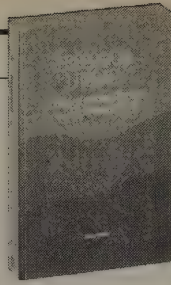
"We may infer from the mismanagement of the environment throughout the century that most [people] emerged from their association with . . . various educational institutions as ecological illiterates, with little knowledge of how their subsequent actions would disrupt the earth." With these fightin' words, David Orr begins to build his case that education holds the greatest potential for nudging society toward the elusive goal of sustainability. He's no mere all-we-gotta-do-is dabbler; he's the founder of the famed Meadow Creek project and is currently directing the audacious attempt to make Oberlin College an example of sustainable applied ecology (*Ecolog* p. 123). The writing is necessarily erudite and academic but is nonetheless easily read and comprehended. Good thing it is, for his proposals are deeply, essentially right. I consider this to be the most important book I've reviewed in many years. —J. Baldwin [Suggested by Jake Vail]

■ The discipline of economics has taught us little or nothing of the discipline imposed on us by physics and by natural systems. To the contrary, these are regarded as minor impediments to be overcome by substitution of materials and by the laws of supply and demand. But economics is, in turn, a part of a larger enterprise to dominate nature through science and technology.

● *Maintenance versus unlimited growth.* The two systems also have different goals. Natural evolution at the ecosystem level leads toward increasing diversity, ecological complexity, stability, and balance. Left to itself, nature evolves in ways that tend to create systems that are stable over long periods of time within relatively narrow limits. As systems "mature," nutrient cycles become tighter, and more energy goes into maintenance rather than into growth. Life at the planetary level, according to Lovelock, is an active agent in maintaining the climate and temperature conditions appropriate to more life. Gaia is a vast system including bacteria that controls levels of atmospheric gases. As conditions move away from those suitable for life, biological organisms act to restore the balance.

Modern societies, by contrast, seem to have adopted the purpose of growing to their maximum extent. Having eliminated most or all of their natural competitors, humans now face no limits other than those imposed by the planet or the perverse consequences of their own actions. Evolution has equipped humans with no instinct that tells us when enough is enough.

■ The eruption of environmental awareness



### Ecological Literacy

(Education and the Transition to a Postmodern World)

David W. Orr, 1992 (SUNY Press); 210 pp.

**\$14.95** (\$17.95 postpaid) from C.U.P. Services/Order Dept., P. O. Box 6525, Ithaca, NY 14851; 800/666-2211

across the planet has occurred without significant national political leadership anywhere. Leaders of the stature of Gandhi, Roosevelt, and Martin Luther King, persons capable of defining, clarifying, and motivating people toward a sustainable future, have yet to appear at the national or international levels. But they are beginning to appear at state, local, and neighborhood levels nearly everywhere. In various ways, millions of people know that the earth is reaching its limits, that things are out of balance. Transformative leadership must first articulate what people feel in their bones, then translate this into a coherent agenda of reform and change within the context of familiar values of justice, fairness, peace, and democratic participation.

■ The study of institutional resource flows can lead to three results. The first is a set of policies governing food, energy, water, materials, architectural design, landscaping, and waste flows that meet standards for sustainability. . . .

The study of campus resource flows and the development of campus policies would lead to a second and more important result: the reinvigoration of a curriculum around the issues of human survival, a plausible foundation for the liberal arts. This emphasis would become a permanent part of the curriculum through research projects, courses, seminars, and the establishment of interdisciplinary programs in resource management or environmental studies. By engaging the entire campus community in the study of resource flows, debate about the possible meanings of sustainability, the design of campus resource policies, and curriculum innovation, the process carries with it the potential to enliven the educational process. I can think of few disciplines throughout the humanities, social sciences, and sciences without an important contribution to this debate.

Third, the study and its implementation as policy and curriculum would be an act of real leadership.

● Should we strive to teach values appropriate to sustainability, or should we present these as only one possible orientation to the world? Is it possible to treat the work of Julian Simon and economist Nicholas Georgescu-Roegen as if they are equivalent? Is value-free education possible? Is it desirable? If neither, how can values be integrated into the learning process without jeopardizing objectivity and a fair treatment of facts, data, and logic?

As difficult as these issues may be, there are good precedents for the integration of objectivity with a strong value orientation. Medical education, for example, has a clear bias toward human health, not disease. The overriding concern of reputable international relations scholars such as Quincy Wright, Kenneth Boulding, Richard Falk, and Anatol Rapoport is the promotion of peace, not war. Likewise, economics is intended to expand our understanding of the conditions for prosperity. Except by pedants, knowledge has never been regarded as an end in itself, but rather as a means to human well-being. By the same logic, environmental studies ought to have a clear direction favoring harmony between human and natural systems while preserving objectivity in the handling of facts, data, and logic.

■ We might ask why we know so much about chemical-based agribusiness and so little about the means and techniques of sustainable agriculture. Or about manipulative medicine to the exclusion of preventive medicine and nutrition. Or, until recently, about energy production instead of conservation and renewable sources? Why do we spend several hundred billion dollars each year for weapons and preparations to fight wars and a fraction of one percent of that amount on peace research? In each case, the reasons cannot be found in comparative data about efficiency, or ecological impacts, or public morality.

Knowledge, for all pretensions to the contrary, is biased by the way in which we determine social and economic priorities. To respond that science is a self-correcting enterprise through mechanisms of peer review is no answer at all. Science can be directed toward life-enhancing or life-destroying research, each performed with great rigor and dedication.

But how does a society determine priorities in creating and preserving knowledge that accords somehow with ecological realities? If true understanding of ecosystems and the human role in nature require, as I believe it does, development of alternative modes of knowing and perceiving that are integrative, what does this mean? How does one "do" integrative science? How do we perceive holistically?

## The Once and Future Superpower

Is it really a matter of environment versus people, business, jobs, and national security? Rocky Mountain Institute researcher Joseph Romm delivers a well-argued, nonpartisan NO! in this convincing book. In typical RMI fashion, he takes the next step and also presents a strategy in enough detail to get our country started toward an environmentally sustainable economic recovery with improved security. He's made it all remarkably easy to read, while voluminous footnotes satisfy academic rigor. This book leads the shift from whining and doomsong into action. —J. Baldwin

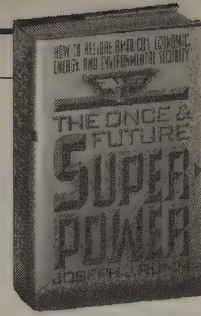
■ A fast-cycle business strategy reduces risk as efficiently as a fast-cycle military strategy. For instance, the danger posed to Honda's market share by GM's Saturn has been reduced by Honda's ability to incorporate Saturn designs into its Civic CRX before Saturn was even introduced.

■ In 1991, the administration opposed a plan to create a tiny \$10 million fund within the National Institute of Standards and Technology to loan money to small- and medium-sized businesses to develop and demonstrate the commercial feasibility of advanced technologies. Commerce Secretary Robert Mosbacher argued: "We cannot support putting the government in the position of competing directly with private

banks and venture-capital firms, nor can we support giving specific advantages to some companies over others for particular commercial products." Here is the quintessential folly: Just as competition from foreign countries with aggressive government-sponsored industrial policies has intensified, the U.S. federal government has abdicated its responsibilities.

■ A University of Alaska study concluded that state spending on weatherization (installing weatherstripping, insulation, storm windows) "creates more jobs per dollar of outlays than any other type of capital project — almost three times as many direct jobs as highway construction."

● Funding for urban mass transit should be increased, not cut. It is often argued that mass transit exists only because of taxpayer subsidization far in excess of collected fares, while road use is largely covered by users fees (primarily gasoline taxes). The California Energy Commission, however, notes that while gas taxes cover 70 percent of total road construction costs, they do not cover "maintenance costs, vehicle facility costs (such as parking lots), loss of property tax revenues from land set aside for roads and other facilities, social service costs (i.e., police, ambulance, court, legal) and health and environmental costs." The



### The Once and Future Superpower

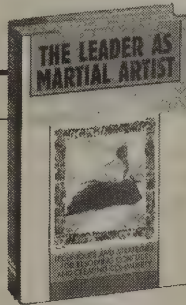
(How to Restore America's Economic, Energy, and Environmental Security)

Joseph J. Romm, 1992; 320 pp.

**\$23** (\$24.50 postpaid) from William Morrow and Co./Wilmore Warehouse, 39 Plymouth Street, Fairfield, NJ 07004; 800/843-9389 (or Whole Earth Access)

commission cites one study concluding that the full public subsidy for users of public roads is twice as large as the subsidy for mass transit.

■ The most effective way for the United States and the world community to create a new order based on cooperative security is neither with export controls nor with the threat of a coalition military response. Rather it is with the promise of a new path: a richer life linked to demilitarization. Japan and Germany remain the most celebrated success stories of such a policy.



## The Leader as Martial Artist

"What is the spirit of the times — Democracy? Tyranny? — the Tao in turbulence? Can we develop something more exciting than war and also more sustainable than peace? How do we become leaders that support community within conflict?"

This volume begins with the author's question: "Am I sufficiently developed to write this book?" This spirit of humility suffuses a remarkable study of psychological and political insight addressing the growing problems of conflict and leadership. What follows is a provocative appraisal of an invigorated human spirit. A spirit that employs intriguing new visions: the metaskills of leadership; deep democracy; social entropy; timespirits; ideas constructed as the tools and conditions for working in the third millennium — "... a world with five thousand languages and religions and whose inhabitants seem to know more about launching space vehicles than about getting along with each other." This book is significant, passionate, important. —Jean Gilbert Tucker

### The Leader as Martial Artist

(An Introduction to Deep Democracy)

Arnold Mindell, 1992; 176 pp.

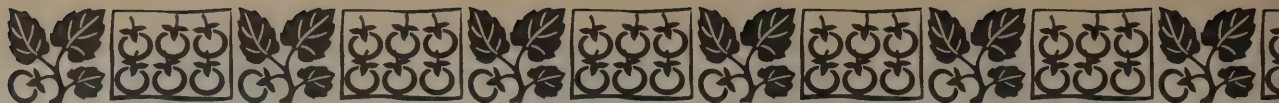
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■ As we enter the twenty-first century, we have the separate worlds of politics, psychology, spirituality, and physics. There are field theories, dreamwork and bodywork, relationship and transnational organizational work. It is now time to develop our "worldwork," a method that helps small and large groups of people to live, work, and grow together within their environment. We need worldwork that employs but is not limited to our knowledge of psychology, the sciences, and spiritual traditions. We

need to develop a new profession that works with large groups as well as individuals to create a more meaningful and exciting world. Our new profession must put the older ones together and interact usefully with the environment and the physical universe and profit from the spirits of the times in which we live.

● Leaving the Field  
*Retreating* If you have adequately found out which side you were on, expressed that side, and followed all the changes, you may find both yourself and your opponent automatically retreating. This is a subtle moment to notice. Use your awareness to see if there is a slight moment of relaxation, a flicker of a smile, a small sigh of relief. If so, let go and leave the field.

This is an extremely important moment in a conflict. It is easy to miss signals of deescalation because most people avoid conflict for so long that when they finally enter it, they become addicted to the state and resist leaving it behind. Notice your deescalation signals and then forgive your opponent and yourself as well.



# Economics & Ecology

## The Business Environmental Network

BY DEBBIE MYTELS

**N**EARLY THREE YEARS AGO, Phil Geller, an engineer with a Silicon Valley firm, collaborated with a handful of co-workers to set up an office recycling program. Meeting outside company time, Geller's group found it a challenge to figure out a system for collecting lunchroom cans and bottles, selling them to an outside vendor, and getting other employees to participate. The company's management was dubious about the program and insisted that it would have to pay for itself.

"It would be really helpful if we could talk with others who've done this elsewhere," Geller mentioned to a staff member at Palo Alto's Peninsula Conservation Center (PCC). And so, a few months after Earth Day 1990, the Business Environmental Network was conceived.

Over the next nine months, the idea grew into a Business Environmental Network (BEN) kickoff conference, organized by the PCC and cosponsored by Apple Computer, Digital Equipment Corporation, local chambers of commerce, and other local companies and organizations. The purpose of BEN is to help businesspeople find information that can improve their environmental performance. BEN now comprises over 90 member companies, mails out over 2,000 copies of its bimonthly newsletter, *EcoOpportunities*, and sponsors regular seminars and lectures on how businesses can reduce their impact on the environment.

From the start, the network has aimed to spread information that's truly useful to businesses. Rather than taking the perspective that "this is what environmentalists think you should be doing," BEN disseminates "what other companies are doing that is good for the environment." By presenting "success stories" of businesses whose environmentally sound practices are paying

off, BEN meets the needs of the 9-to-5 world while accomplishing a "green agenda."

The first BEN conference in 1991 had three types of attendees. The first group consisted of people from companies such as Apple and Xerox, which enjoy a strong management commitment to environmental values; these folks were looking for cutting-edge solutions, such as how to design products for recyclability. A second group was beginning to implement basic programs, such as office recycling and water conservation;

*The Business Environmental Network is a good example of how environmentalists and nonprofit organizations can form productive partnerships with business. The businesses win by getting local, cost-effective help with their environmental problems. The nonprofits win by educating new constituents (and potential donors) and generating revenues to underwrite their programs. The BEN is a great model that I hope other nonprofits can put into action in their communities.*

*Debbie Mytels is Executive Director of the Peninsula Conservation Center.*

—Tom White

they wanted examples from others' successful solutions, so they could show their managers a positive impact on the bottom line. The third group comprised environmentally concerned people working in companies with little interest in "green" issues; these people were looking for personal support as they tried to figure out how to approach their companies.

BEN meets these needs by sharing specific information and case studies through its seminars, networking meetings, and newsletter. Seminars have addressed "Transportation Alternatives" — how some companies are getting employees out of their cars; "Eco-preneur-ing" — creating a business that meets an environmental need, such as anti-freeze recycling; and "Wrap It Up" — about environmentally responsible packaging (which included a tour of a firm which recycles polystyrene into packing chips).

BEN's "Close the Loop Group" organized what was perhaps the most well-received seminar, "Battery Recycling Alternatives," on rechargeable vs. throwaway batteries. Reps from various companies shared their successes and problems in battery recycling, for both industrial and automotive use.

The network's other major information vehicle is *EcoOpportunities*, an eight-page bimonthly newsletter. Started with a \$5,000 grant from the Palo Alto Rotary Club, the newsletter is available to small businesses for an \$89 subscription (\$199 for companies with over 100 employees). It features effective environmental solutions in local businesses. One company featured was a semiconductor manufacturer whose well-developed recycling program treats every





piece of material that moves through its plant as a commodity with resale value.

Another recent article, describing the problems faced in disposing of fluorescent lighting tubes, lists several Bay Area vendors that recycle the mercury (as well as the glass) from these fixtures. Since a single load of more than 25 tubes is classified as hazardous waste, recycling them can save tremendously on "haz mat" disposal fees, even though the recycler charges for pickup.

Other articles profile people who've spearheaded programs in their companies. For example, one San Jose woman has led her firm from simple white-paper recycling to the recycling of other commodities, such as wire, scrap metal, Styrofoam and low-density plastic. Her efforts have decreased her employer's waste-hauling costs by about \$600 per month.

Although some advisory-committee members have helped BEN with fundraising, their most important role is to be "eyes and ears" for the project. Attendees at bimonthly meetings are asked questions like: "What kind of newsletter articles would be most useful to you?" (The answer: "Articles that show us how to save money *and* do right by the environment.") "What new issues and ideas have you come across lately?" "Would your company benefit from a seminar about 'What is a good environmental regulation?'"

An invaluable component of the project's human resources has been the BEN interns, most of whom are college students or recent grads. Combining a concern for the environment with a hopeful outlook that businesses can provide jobs while improving their environmental performance, BEN interns have assisted the project in a variety of ways: writing newsletter articles, answering phone inquiries, collecting material for information packets, maintaining the database, preparing business case studies, visiting firms with good environmental practices. During the past 18 months, BEN has had eight interns; some received academic credit from Stanford University, and all were exposed to the variety of ways environmental management is taking shape in BEN member companies.

BEN has encountered a few problems along the way. Chief among these has been the difficulty of funding. In addition to the Rotary grant, four large Bay Area firms (Apple Computer, Advanced Micro Devices, Digital Equipment Corporation, and Pacific Gas & Electric) are BEN "Visionary Members," contributing over \$1,000. Although several foundations have been approached for grants, to date none have come through, perhaps because other community needs seem more pressing than assisting businesses in changing their habits. While membership support has been coming in steadily, the recession has limited the funds that many companies can spend on information resources.

Without strong financial support, BEN's growth has been slower than initially hoped for. All the work associated with a start-up has fallen to one paid staffperson and her crew of volunteers. Others considering a similar project should analyze how it will be funded and how much can be carried out by volunteers. Since businesses expect a high level of professionalism, it is also imperative to maintain high standards for work done by volunteers.

Another pitfall to avoid is competition with other groups. In some communities the issue of "corporate greening" is being addressed both by trade associations and by environmental groups. Avoiding turf wars by finding ways to work together increases the quality of services and avoids their duplication. Because environmental management encompasses so many areas, it's important for a group such as BEN to define its niche carefully.

For example, BEN decided not to address hazardous-materials issues. Since this is a heavily regulated field, many other associations and training programs provide haz-mat information; additionally, a high level of technical expertise is necessary. BEN also generally bypasses issues of worker health and safety. "Having defined a more limited scope, we are more effective at addressing the information needs of our target audiences: facilities managers, recycling coordinators, transportation managers, energy engineers, and

others who are dealing with conservation programs," project coordinator Candice Stark explained.

Animosity, latent or blatant, between business and environmentalists is another potential problem. The support and involvement of business-oriented organizations have been essential for BEN to achieve its mission. This business involvement opens up the potential for "greenwashing" of corporate environmental problems. But since BEN has grown as an offshoot of the Peninsula Conservation Center, a local environmental group with a longstanding reputation for integrity, its environmental credentials are impeccable.

As businesses strive to meet the growing number of environmental regulations, companies are coming to realize that such issues can be an opportunity, not just a burden. Rather than looking at "what comes out of the pipe," as BEN advisor Rob Shelton of SRI International said recently in *EcoOpportunities*,

Companies are going to the opposite end of the pipe. There you see a whole different set of solutions. You see an opportunity to change your processing. To change the materials you buy — to make some different tradeoffs, not just between profitability and the environment, but between operations, employee training, and capital costs. It's more complex, but in that complexity, some companies have had real breakthroughs such as the \$506 million . . . that 3M made over the sixteen years of its Pollution Prevention Pays program — by eliminating or decreasing the source of waste, not just treating it at the end of the pipeline. ☛

**For more information about the Business Environmental Network, contact coordinator Candice Stark at 415/494-9301 or write to BEN c/o Peninsula Conservation Center, 2448 Watson Court, Palo Alto, CA 94303.**

## 50 Simple Things Your Business Can Do . . .

This easy-to-use guide, by the creators of the famous *50 Simple Things You Can Do To Save The Earth*, gives you many more than fifty options and alternatives for greening your business. While it's not an all-in-one definitive guide on the how and why of business recycling, it's the most encouraging, accessible introduction I've seen. A great book to start your Green Team brainstorm! —Tom White

• Each year, U.S. businesses buy 500 million wooden pallets. Stacked on top of each other, they'd form a pile reaching 3,617 miles into the sky — the equivalent of 14,146 World Trade Center towers.

70% of those pallets are made from oak and other hardwoods. In fact, more hardwood goes into pallet production than into paper-making.

Since the estimated cost to transport and dump one ton of trash is \$180, U.S. companies could be spending up to \$1.75 billion a year just to throw wooden pallets into landfills.

### Simple Things to Do

If your pallets are only used a few times

- Buy pallets made from recycled corrugated cardboard. They're priced about the

same as a wooden pallet, but they can be bundled with other cardboard and sold to a recycler.

- Cardboard pallets can support loads up to 6,000 pounds. But they weigh up to 77% less than wooden ones, lowering transportation costs.

If your pallets are used indefinitely

- Buy pallets made of recycled plastic. They cost 5 to 10 times more than wooden pallets, but can last at least 10 times longer. You can also repair them yourself. When they're no longer usable, they can be recycled and turned into other useful items.

If you use wooden pallets

- Use parts of damaged pallets to repair salvageable pallets.
- Buy a chipper to turn unusable pallets into wood chips, which are used as mulch.

### The Bottom Line

For Your Company

- Cardboard pallets cost between \$6 and \$7. They eliminate trash hauling fees, produce income from recycling and can cut shipping costs because they're lighter. Shipping a cardboard pallet holding one ton of goods costs about \$12.50 less than with a wooden one. That's about twice the cost of the pallet itself.



## 50 Simple Things Your Business Can Do to Save the Earth

The EarthWorks Group, 1991  
(EarthWorks Press); 120 pp.

**\$6.95** (\$8.95 postpaid) from Tilden Press Inc., 1526 Connecticut Avenue NW, Washington, DC 20036; 800/955-GREEN (or Whole Earth Access).

Free with subscription to *The Green Business Letter* (opposite page).

- Plastic pallets cost between \$35 and \$55 and are designed to last for years. If they eliminate the need for 10 wooden pallets — as they should — they'll more than pay for themselves.

For the Earth

- Using pallets made from recycled and recyclable materials can save trees and significantly reduce dumping. Transporting lighter-weight pallets also saves on oil and creates less pollution.

## The Tightwad Gazette

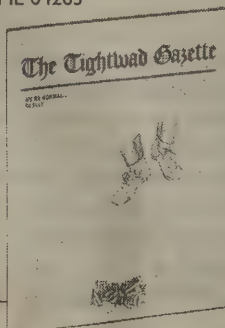
This down-home, skinny paper is full of tips for saving a little money here & there, often while reducing environmental pressures. Here's how to make your own aluminum-free baking powder; uses for recycled milk jugs; how to darn socks (egad!). It's the stuff older folks learned from the Great Depression, writ modern. The silliness line is drawn at splitting double-strength toilet paper, the pragmatic editor noting that "you have better things to do with your life." Assiduous tightwadders could probably save more than the price of a subscription.

—J. Baldwin

### The Tightwad Gazette

Amy and Jim Dacyczyn, Editors.

**\$12/year** (12 issues). R.R. 1, Box 3750, Leeds, ME 04263



## HOW TO DISSECT A PAIR OF PANTYHOSE

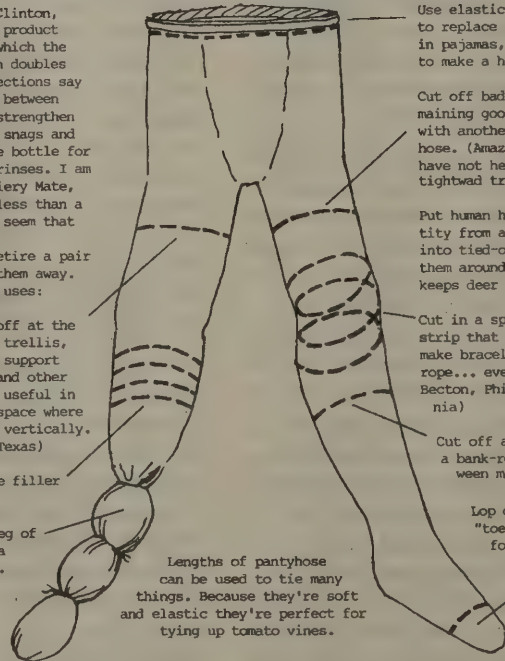
Hortense DeVall of Clinton, Maryland, swears by a product called Hosiery Mate, which the maker claims more than doubles hosiery life. The directions say that you should rinse between wearings and it will strengthen the fibers to prevent snags and runs. A 16-fluid-ounce bottle for \$3.50 is good for 60 rinses. I am not familiar with Hosiery Mate, but because it costs less than a pair of hose, it does seem that you would save money.

When it's time to retire a pair of hose, don't throw them away. Cut them up for other uses:

Segments can be tied off at the bottom, attached to a trellis, and used as slings to support cantaloupe, eggplant and other heavy fruits. This is useful in gardens with limited space where produce must be grown vertically. (Jill Finch, Irving, Texas)

Cut into loops to make filler for stuffed animals.

Put onions into one leg of clean pantyhose. Tie a knot between each one. Snip onions off as needed. No mess. (Kathy Takvam, Silver Bay, Minnesota)



Use elastic for a bungee cord, or to replace stretched-out elastic in pajamas, or cover with cloth to make a headband.

Cut off bad leg and wear the remaining good one-legged pantyhose with another one-legged pantyhose. (Amazingly, some people have not heard of this oldest of tightwad tricks.)

Put human hair (obtained in quantity from a barber) or dog hair into tied-off sections and place them around garden. The scent keeps deer away.

Cut in a spiral to make a thin strip that can be crocheted to make bracelets, headbands, rope... even a bikini. (Lorelle Becton, Philadelphia, Pennsylvania)

Cut off and wear over head for a bank-robber or monster Halloween mask.

Lop off the toes. Put a "toe" on each foot before you put on a new pair to keep the toes from wearing through. (Gloria Gehring, Phillips, Wisconsin)

Lengths of pantyhose can be used to tie many things. Because they're soft and elastic they're perfect for tying up tomato vines.

## Guide to Commercial Recycling

In the late 1980s, the Santa Clara County Manufacturing Group — an industry lobbying organization that looks out for the interests of Silicon Valley's largest businesses — set up a Solid Waste Committee composed of reps from a dozen large companies. Coming from the perspective of what makes economic sense (rather than environmental evangelism), the **Guide to Commercial Recycling** is an exceptionally useful tool to Bay Area businesses because of its comprehensive listings of "where to recycle \_\_\_\_." The **Guide** is also valuable in other communities because of its "how-to" information on starting a program, training employees, finding vendors for waste commodities and moneymaking strategies. Updated on a regular basis, the manual is sold in looseleaf form, modeling its suggestions for waste reduction by using surplus binders and recycled paper copied on both sides. Appendices include useful forms, a glossary, bibliography, and local and national directories.

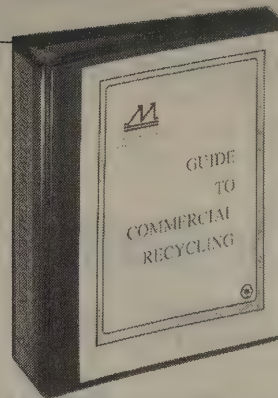
—Debbie Mytels

Whirlpool, Digital Equipment, Electrolux, 3M and General Electrics are just a few of the corporations beginning to incorporate design for disassembly, or DFD, in their thinking and in their products. Europe is several years ahead of the United States when it comes to this thinking, although Electrolux is already marketing a DFD dishwasher through its Italian subsidiary, Zanussi. Prompted by the introduction of more than 800 pieces of environmental legislation in 1989, mostly at state and local levels, companies in the United States are beginning to take recycling seriously.

Where do you start? Glue and screws, for example, are enemies of DFD. "Pop in, Pop out" two-way fasteners are the way to go. Composite materials are also enemies of recycling. They combine glass, metals, plastics, and other fibers, making coding and separation of materials nearly impossible and uneconomical. Thermoplastics are so widely used that they are becoming their own waste problem. However, unlike so-called thermoset plastics, thermoplastics can be reheated and remolded. The plastic

shell of a computer can be recycled to form a car bumper and then a third time to form plastic lumber two-by-fours for architectural use. . . .

For all its initial success, one question still haunts design for disassembly (DFD): What kinds of incentives will be needed to convince consumers to recycle big, complex products? It's one thing to ante up an extra nickel for a bottle of cola and get the money back a week later at the grocery store, but turning a big-ticket item like a car into a huge returnable can of soda by adding a \$500 deposit to its price, could be marketing death. Regardless, the clock on the plastic waste problem is ticking. Landfills are filling up, recycling laws are being passed and the cost of dumping waste is going up. DFD may keep those dumps from overflowing, and may keep governments from mandating Advance Disposal Fees on all products.



### Guide to Commercial Recycling

Solid Waste Committee/SCCMG, 1992; 136 pp.

\$20 postpaid from Santa Clara County Manufacturing Group/Director of Environmental Affairs, 5201 Great America Parkway/Suite 426, Santa Clara, CA 95054

## The Green Business Letter

If you want to keep current on green business practices, **The Green Business Letter** is one of the best sources I've seen. It's published by the same folks who brought you **The Green Consumer Letter** (WER #74). This newsletter updates the success stories and resources brought to you in **50 Simple Things Your Business Can Do . . .** The attitude of the newsletter is results-oriented. It speaks to people who are trying to balance the concerns of management, employees, and the environment. —Tom White

It takes a rare breed of employee to tackle the entire system on his or her own, and an even rarer breed of company to permit such bottom-up leadership to take place.

This notion of bottom-up leadership is an essential — some would no doubt call it the essential — component of nearly any environmental initiative.

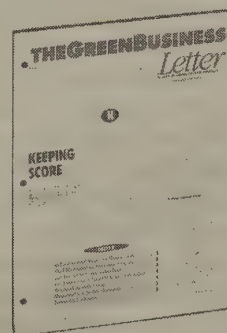
### Factory Incentives

A year-old industry group is trying to help manufacturing companies become more environmentally aware. Last year, the National Center for Manufacturing Sciences (NCMS), a 140-member consortium of manufacturers, launched the Environmentally Conscious Strategic Manufacturing Initiative, whose aim is to pool money, expertise, and other resources to improve manufacturers' environmental performance. Although the group had its first planning meeting just last June, it has launched 14 projects within five program areas (CFC

and VOC substitutes, lead alternatives, bioremediation, metal cutting fluids, and emissions from painting and plating operations), and will launch 14 more before the year is out.

### Reach Out and Exchange Something

Not mentioned in our round-up of online services is a regional one — TEAM-W (The Electronic Answer for Managing Waste), from Cincinnati Bell. The service aims to help local businesses reduce waste by offering instant access to buyers and sellers in the area. The service also offers news, tips, and resources. For a free demo, call 513-369-0331 via modem. Type "VISITOR" at the log-in prompt.



### The Green Business Letter

Joel Makower, Editor.

\$97/year (12 issues) from Tilden Press Inc., 1526 Connecticut Avenue NW, Washington, DC 20036; 800/955-GREEN



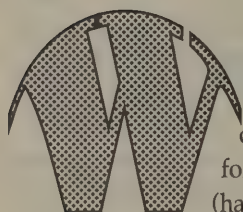
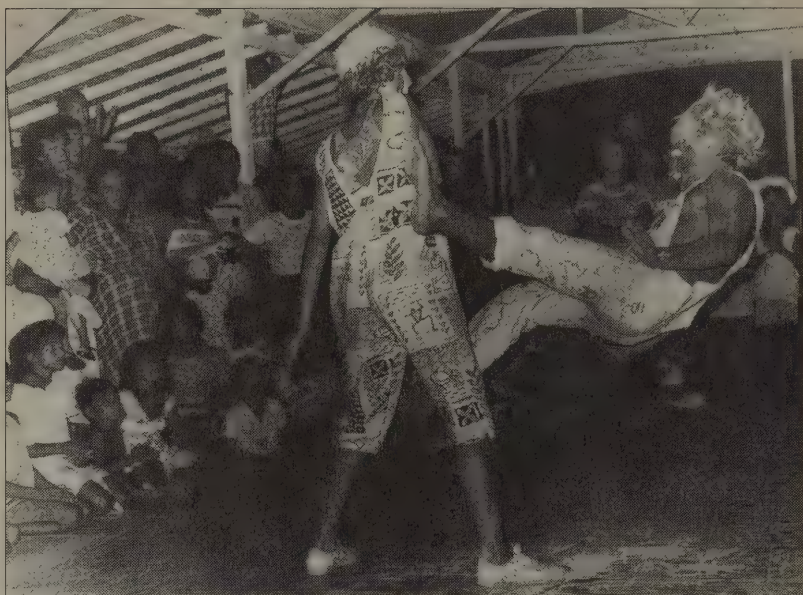
**BREAD TABS** Use for stitch counters on knitting needles. Or use as a divider for index cards. Secure with tape on both sides. Use a permanent marker. (Dolly-Ellen Walters, Eagle River, Alaska)

# CLOWNS UP THE RIVER

## The Amazon's Health and Happiness Project

BY CHARLES L. JOHNSON

Photographs by Caetano Scannavino



WHEN MOST FOLKS THINK ABOUT POVERTY in the Third World, the prevalent image is one of urban crowding, in favelas, colonias — many are the words for the shantytowns that “symbolize what is wrong” (hah!) with the countries where they are found.

Outside of its major cities, the Brazilian Amazon is not known for favelas, although the poverty is nonetheless real. Isolated communities can be islands of misery in the midst of splendor, of shortage in an area of plenty, places that suffer from their long distances from the amenities of “civilization.” People are cut off not only from the tangible aspects that could better their standard of living — medicines, tools, and the like — they are also isolated from ideas and concepts, what could be summed up in a single word: awareness.

### WATER, WATER, EVERYWHERE . . .

But not a drop that is potable without treatment. Though many species of Amazon wildlife depend on the flood cycle for their survival, it can prove hazardous to the human species. Rainy-season flooding means less land for farming, fewer pastures for livestock, more difficulty in catching fish, and pollution from human

waste that mixes with the drinking water. The result is disease, epidemic and endemic, caused by poor sanitation linked to undernutrition.

All of this describes the situation faced by Dr. Eugenio Scannavino when he arrived in Santarem, a city in the heart of the Amazon, about halfway between Manaus and Belem, and near where the Tapajos and Arapiuns Rivers join up with the Big Mama, the Amazon River itself. It was early in the 1980s, and Dr. Eugenio had just finished a stint in the favelas of Sao Paulo. He could see that there was little medical care outside of Santarem, and an even shorter supply of technological skills for utilizing the area's available resources. It wasn't long before he developed a plan to deal with the myriad problems — the Health and Happiness Project (Projeto Saude e Alegria).

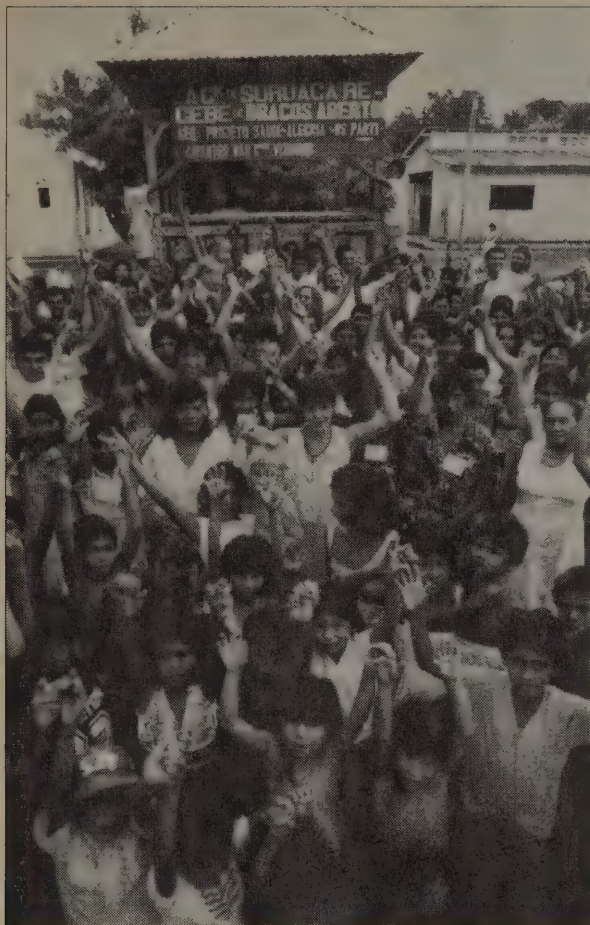
The project was founded in 1984, but soon came to a halt due to a lack of

A circus skit in a remote Amazonian village delights and educates. The clowns — members of the Health and Happiness Project — make agronomy and public health education entertaining.

funds. It got off the ground again in 1988, and in the four years since has become an outstandingly popular and effective means of improving the quality of life of people living in virtual isolation — there are no roads connecting the 19 communities and 94 settlements the project covers, other than the rivers. At present, it reaches more than 20,000 people.

The 32-member staff is divided into seven sections. Their names will give an idea of the areas in which the project operates: Health,

*Charles Johnson is a US citizen living in Rio de Janeiro. His work as a translator there turned up this bit of positive news from the Amazon Basin. He describes a kind of appropriate rural assistance that is too small and sensible for the World Bank, too remote from Brazil's political and economic turmoil perhaps even to survive, but too good a model to lose. —Richard Nilsen*



The first All-Community meeting of the Health and Happiness Project in the village of Suruacá, 1990. The people are caboclos, a mixture of indigenous and European races.

Education, Art, Communication, Rural Production Development, the Information and Research Center, and Administration.

If any undertaking is to be successful, it first has to get the attention of its target, which is every member of the community. What better way than to stage a show, an idea that led to the creation of the Great Mocarongo Health and Happiness Circus ("Mocarongo" being the local name for people living in this area).

#### SEND IN THE CLOWNS

The Circus is a lot more than a bunch of clowns and jugglers and tightrope walkers. Behind the masks and greasepaint hide doctors, nutritionists, veterinarians, agronomists, educators, and other community-development experts.

When the circus rolls into town — make that "sails into town" — it is first of all a call to work. The Health

and Happiness team uses the spectacle as a means of generating excitement in order to promote its three main community-oriented objectives: health, rural development, and maintaining the local culture. The show is a drawing attraction that aids in teaching people about health care, how to boost production, and how to better a host of other activities, including gardening, small-animal raising, handicrafts, rubber tapping, teacher training and tree raising. The keystone is environmental education.

The H&H staff quickly realized that two emergency needs had to be dealt with: health care (since there were few medicines, almost no clinics, and a slew of misconceptions as to good health practices) and improving the output and variety of foods available (especially during the flood season, when fish become scarce and most people subsist on a mixture of manioc flour and water known as *chibá*).

The titles given to some of the first programs to be carried out reflect these priorities: "Contamination and Illness Cycles," "Life and Environment Cycles," "Community Health," and "Human Ecology."

#### IS HEALTH WHAT YOU HAVEN'T GOT?

As the project was getting underway, community members were asked their concepts of health. They tended to define it as "getting sick and then getting well." Since there were essentially no clinics or medical personnel, prevention was mostly an unknown process. A clinic, for most people, was a place where you went only when you were severely sick or hurt. The low economic level precluded any sort of investment in this area. And when one lacks the means and the know-how to stay healthy, the result is — not surprisingly — a fatalistic attitude toward death and illness, poignantly reflected in the high infant mortality rate.

Once the emergency situation was under control, the time came to go beyond merely treating injuries and illness and providing medicines. The next phase involved training what are called "health monitors" in each community. These people learn medical skills at what might be described as the paramedical level — first aid, giving vaccinations, and performing emergency tooth extractions. Equally important, they teach community members the fundamentals of good health, always stressing preventive measures. As far removed as these communities are from medical facilities, fast action is often required to combat chronic problems. Diarrhea is one example. Among Americans, the word has a somewhat humorous connotation — the "trots," and so forth. But among these riverbank people, it is a matter of deadly seriousness, especially in the case of infants. Sudden dehydration through diarrhea in young children is a common killer. It can be treated by using a homemade oral rehydration solution made of a mixture of sugar and salt in water. Other simple yet life-saving methods include adding

*“storehouse” of the folklore  
and woodlore in this part of  
the Amazon, an invaluable  
body of knowledge.*

a chlorine solution to polluted water to make it safe to drink. Monitors are the educational link in making their fellow community members aware of the effective home remedies at hand. The name “monitor” is significant, since these workers are also taught how to keep records to track the status of public health in the community, as well as to detect and advise health authorities of impending problems, such as threatening outbreaks of disease. This is truly a “bootstrap” program, in that trained monitors fan out into surrounding areas to pass on their skills to others. H&H estimates that these monitors are now able to handle upwards of 70 percent of health problems, evidence of their crucial role within the project.

It is common for children to be left in charge of their younger siblings when mom and pop are out farming, hunting, and the like. Consequently, H&H has created a Kiddy Monitor program, whereby children between the ages of six and fourteen are taught basic skills that they apply to caring for their brothers and sisters.

These programs indicate a core concept underlying H&H: To endeavor to involve 100 percent of the people in participating in, and ultimately catalyzing, the decisions that will lead to improving their quality of life.

Realizing the need to break away from the fish-and-chibá cycle, the project has put teeth into its nutrition program. It has a team of agronomists that work with farmers to show how the quality and yield of local plants can be improved, with a number of experimental farms now in progress. A vet provides small-animal raisers with support, knowing that increased production translates into a diminished need to hunt (and deplete) wildlife in the surrounding forest.

In the belief that knowledge of the environment enhances respect for it, the H&H approach strives to make community members aware of the vast resources available in the surrounding forest — a supply of food, curatives, housing and potential income from extractivism — while em-

phasizing the need to properly use and preserve these resources (in view of the environmental necessity of sustainable development).

Education forms part of an ambitious H&H project intended to revamp teaching methodology along two lines. First, the overriding philosophy is that teaching should be tailored to local realities, drawn from the geography, climate, and culture of each community. This concept stems from the fact that in Brazil, education curricula are based on a national “standard” that reflects little of the country’s vast cultural spectrum. Secondly, learning should be based on game-playing — things that are fun sink in deeper. With their obvious reflection of the good feelings produced by the circus, games are an important educational tool that can be applied to virtually every activity. After all, it’s much more exciting to learn about bees, if, for example, for a brief while you can actually be a bee.

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#### A DAY IN THE LIFE

As the H&H boat chugs in, it is greeted by the community amid much hullabaloo. Since many of the staff show up in clown garb, the walk into town often becomes a mini-parade, jugglers juggling and musicians playing.

But hold everything — business before pleasure. During the day, activities are mainly divided among checking and doing. In conjunction with health monitors, children are examined and weighed (especially the newborn), expectant mothers are given a checkup in the presence of midwives, community health status records are updated, and immediate medical problems are attended to. Each community has a Mothers Club, one of whose duties is to work with nutritionists to learn how the family diet can be improved. This may include pointing out the medicinal herbs that are found nearby, plus tips such as using ground eggshell as a handy source of calcium, or sticking a rusty nail in an orange to furnish iron to combat anemic deficiencies (a little weird, perhaps, but

it works). Another program that ties in with the Mothers Clubs is called “Women: Body and Soul.” It deals with a wide range of subjects, such as mother-child relations, body awareness, cottage-industry production and handicrafts.

Experts in the Rural Production section work with community members in a number of agricultural areas. Included are chicken and pig raisers, rubber tappers, and farmers, who are being taught how to develop new and more nutritious species of existing native plants, particularly the ubiquitous manioc. Another handy tip is the use of the termites that abound in the region as a source of protein for feeding chickens.

In communities with a school (invariably of the “one-room schoolhouse” type), H&Hers meet with children and teachers to check on standard programs such as proper tooth-brushing techniques, or the tree nursery — a popular activity among schoolkids. Part of the Fruition project, the latter is an attempt to preserve and upgrade local varieties of trees, as well as to introduce useful species that are not found in the region, such as certain citrus fruits.

As the day wears on, preparations begin for the evening performance of the circus. Once again, the idea is not just entertainment, but educational entertainment, given an extra push through the community’s kicking up its heels and taking part. No way is it merely a show *for* the people, it is a show *with* the people. The local pavilion is made ready, costumes are prepared, and skits are rehearsed. H&H acrobats set up their gear — they, too, often pass on their skills, training aspiring tightrope walkers, jugglers and other performers.

A rural first-aid class. Village health monitors trained by the project now handle two-thirds of all health care locally.

Not long after night falls, the curtain rises. The circus is open to everyone; it is a showcase for local talent, musicians, storytellers, hams, and anyone else who might have something to contribute. Those with well-hidden abilities can at least slap on a little greasepaint and clown around. This is no spectator-in-the-bleachers event, but most definitely a hands-on production reminiscent of street theater. At each performance, the community joins with the H&Hers to put on skits with a message: the benefits of forming co-ops; how contagious diseases are spread; the causes and prevention of undernutrition; the dangers of drinking untreated water. These "household hints" are intended to save lives, rather than make your shirts a whiter white or remove that nasty stain from your carpet.

Some places have formed what's known as a Headcold Choir, which puts its musical licks into singing about the respiratory problems that can result from neglecting a simple cold, or from the overuse of medicines.

By the time the evening's festivities have drawn to an end, both H&H staff and community members will have had quite a workout. And this is a project that works. Its ingenious blend of learning while having a good time leaves people feeling good, in body as well as spirit.

Visits normally last three to four days. H&H staff members may also come to call under specific circumstances — the agronomy section, or the medical team in case of a disease outbreak, and so on.

A recent event of great significance has been the cholera epidemic in Latin America. It is to the credit of



the Health and Happiness Project that cholera has thus far been kept away from the areas where the project operates. This is most likely due to three factors: the effectiveness of the health-monitor program, the three years that the project's Hygiene, Rural Sanitation and Diarrhea Prevention program has been implemented, and the widespread use of chlorine solution to create potable water.

**THE CABOCLOS — PRESERVING A CULTURE**  
The current world focus on the Amazon has almost exclusively dealt with the Indians. Very little has been said about the ethnic group that makes up the great bulk of the Amazon population — the *caboclos* (Brazilian for mixed Indian and white: the majority of the population in the area covered by the H&H Project). The *caboclo* culture is perhaps less flamboyant than that of the Indians. There are no tribes of *caboclos*, no ritual dances, no tribal gods (or Hollywood movies). However, translating the somewhat highfalutin Portuguese word *acervo*, these people are the

"storehouse" of the folk- and woodlore in this part of the Amazon, an invaluable body of knowledge.

Herein lies another goal of the project: to keep alive a culture threatened by two classical problems confronting most developing areas — rural flight and the encroachment of the outside world. Here's where the Communications Sector steps in. Besides documenting activities, great efforts are being dedicated to recording the *caboclo* culture. As always, the nut is to get people involved, as evidenced by the program's name, "Grassroots Communications."

Teenagers and thereabouts, being the most likely candidates to skip town and head for the big city, are encouraged to become what the project calls Local Correspondents. They are given the task of documenting the local life, which may range from interviews (oral history) to acting as recording secretaries for meetings of community groups. There is also Live Radio, with recorded material first "aired" to the community itself in a simulated broadcast (at a circus performance,

Outdoor education in a remote riverbank community. Parents learning how to treat something as common as diarrhea can be the difference between life and death for these children.

for example), and with some material taken to Santarem for actual broadcasting as part of a Rural AM program. Toward this end, Grassroots Communications provides training in the methods and lingo of broadcasting. In addition, there are community and intercommunity newspapers that offer prospective journalists the chance to work in this medium, as well as serving as a tool for the exchange of ideas.

Other popular media forms are educational photo-comics, with plots developed by community members and then shot by the H&H crew, and a News Wall, a large bulletin board where community news, photos, and other items are posted.

The outcome is two-pronged: media skills are taught, while the people gain increased awareness of their culture and how they can improve it.

#### THE INFORMATION AND RESEARCH CENTER

The IRC documents and puts out the word about the project, along with serving as a center for research on present and future activities. It works with virtually all media — still photography, video, and audiotape recordings — to compile data on community life and lore. The archives of the IRC are available to anyone who would like further information on the project.

#### THE FUTURE OF THE PROJECT

Project scheduling is naturally keyed toward expansion, aimed at reaching more and more of the isolated communities in the mid-Amazon, and, simultaneously, expanding knowledge. The ultimate goal is for these communities, through their health monitors, teachers, mothers clubs and other involved groups, in tandem with gen-



eral awareness campaigns, to be self-sufficient to the greatest possible degree. It's good to know that your problems are being solved, but even more satisfying is the sense of pride in realizing that you have taken an active part in the process.

The demand cannot be underestimated. As neighboring communities learn about the project (the circus plays no small part in spreading the word), there is an increasing number of requests for information, assistance, and training.

The Health and Happiness Project is a nongovernmental organization administered by the Center for Advanced Studies in Social Care (CEAPS). Its main headquarters are in Rio de Janeiro, and there is a regional office in Santarem.

That Brazil has been undergoing a great deal of upheaval, especially on the economic level, is no secret. In mid-1991, government funding for the H&H Project was put on hold for ten months. The circus came to a halt, then all community visits. The Santarem office could perform little more than caretaker maintenance, meeting with community members who were able to make their way to the city. This was not the first time a shutdown had occurred. The subsequent release of governmental funds in no way implies that the flow will

be constant. For this reason, the project is attempting to assemble a core of backers to ensure that at least current work will not be halted. Any type of support is useful, including donations of money or equipment, for field or office use.

Additional information may be obtained by contacting the project at one of the following addresses. A large collection of documentation is on hand, such as photographs, a 25-minute video and the annual report, both of the latter available in English as well as Portuguese. ☺

#### Projeto Saude e Alegria Centro de Estudos Avançados em Promoção Social (CEAPS)

Rua Paulo Barreto, 23 Botafogo — CEP 22.280-010

Rio de Janeiro, Brazil

Telephone:

(55) (21) 266-7896/226-1519

Telefax: 266-7897

Email (AlterNex): Ax!ceapsrio

#### Projeto Saude e Alegria

Av. Borges Leal, 2284

Cx Postal 243 CEP 68.040-080

Santarem — Para, Brazil

Telephone: (55) (91) 523-1083

Telefax: 523-1083



## Samba

Rio's Carnival and the samba that drives it come to life in a book that includes the smells of poverty and the muddy bare feet of a Brazilian favela. Alma Guillermoprieto is a Mexican journalist who works in English; before she took up writing, she spent a decade as a professional dancer. She has great skill at getting to the root of the rhythm and the motion with language. In 1987, she hung out with the residents of a Rio favela called Mangueira, joined its samba school, and danced in the Carnival procession. Her gender is another asset, allowing entry into the homes and the lives of the black women that this sexist African-Latin culture revolves around.

This is the best writing on race, culture and music I've encountered since Michael Ventura's riveting essay on voodoo, "Hear That Long Snake Moan" (WER #54 and #55). —Richard Nilsen

• How to Samba (Women's Version) . . .

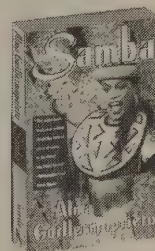
5. Stop hopping! Keep your shoulders down! Face front! The magic of samba lies in the illusion that somebody is moving like crazy from the waist down while an entirely different person is observing the proceedings from the waist up. Keep your torso detached from your hips and facing where you're looking, and practice with a book

on your head until you can stay level at full speed. . . .

Smile: The key rule is, don't make it sexy. You will look arch, coy or, if you are working really hard, terribly American. Your smile should be the full-tilt cheer of someone watching her favorite team hit a home run. Or it should imitate the serene curve of a Hindu deity's. The other key rule: There is no point to samba if it doesn't make you smile.

• The favela concept of "root" is all about the past buried beneath the visible surface. Favela blacks, with not a single history textbook to claim as their own, or one hero of theirs mentioned by name in white textbooks, with hardly the literacy required to get through whatever rare academic studies are available on black culture, are obsessively concerned with their origins. Unlike white Cariocas, whose conversational references to the past rarely extend beyond the previous week, blacks like Nininha can scarcely mention an event without explaining where it came from, how it got to be that way. Sambistas write songs about earlier sambistas so they won't be forgotten; carnival scripts frequently focus on specific historical events; Eurides describes a neighbor and automatically includes a reference to the person's parents. Perhaps this is because so little of what a person can know about his past is known in the favela. Hardly anyone has baby pictures.

Many people are confused about the exact date of their birth, or their name. Cartola discovered that his given name was Agenor and not Agenor only when he was in his late fifties and went to the civil registry to marry Dona Zica. Many children's names don't make it into the civil registry at all. City officials recognize that an undetermined — but high — number of favela births never get recorded. As for history: seventeenth- and eighteenth-century accounts of black life are almost impossible to find in print. And in the nineteenth century, when blacks became a political issue, a leading abolitionist ordered the government slave registers burned to avoid paying indemnification to the former owners. Still, favelados say proudly, "I am root," meaning, "I belong to my past."



### Samba

Alma Guillermoprieto, 1991 (Vintage); 256 pp.

\$11 (\$13 postpaid) from Random House/Order Dept., 400 Hahn Road, Westminster, MD 21157; 800/733-3000 (or Whole Earth Access)

## Landforms and Drainage of the 48 States • The United States (except Alaska and Hawaii)

The U.S. Geological Survey's gorgeous computer-generated **Landforms of the Conterminous United States** (pictured on the back cover of WER #73) is now available in two greatly enhanced commercial versions, one in full color, with argument-settling place names.

Raven Maps has again combined exist-

ing public-domain maps from the Geological Survey to produce a product greater than its sources. On both maps, the large size allows standing back for the big picture. On **Landforms and Drainage** it is unadorned landscape. Only upon close examination can it be seen that the natural features (peaks, deserts, rivers, lakes) are identified in

subtle (but entirely readable) line and type. On **The United States**, full-color altitude tinting is added, grading from a range of greens for lowlands to browns and ultimately greys for the highest mountains — a satisfyingly realistic portrayal. The natural features' names are dropped back closer to the background color and a layer of culture is applied in black: towns, boundaries, and (in faint but still readable color) roads.

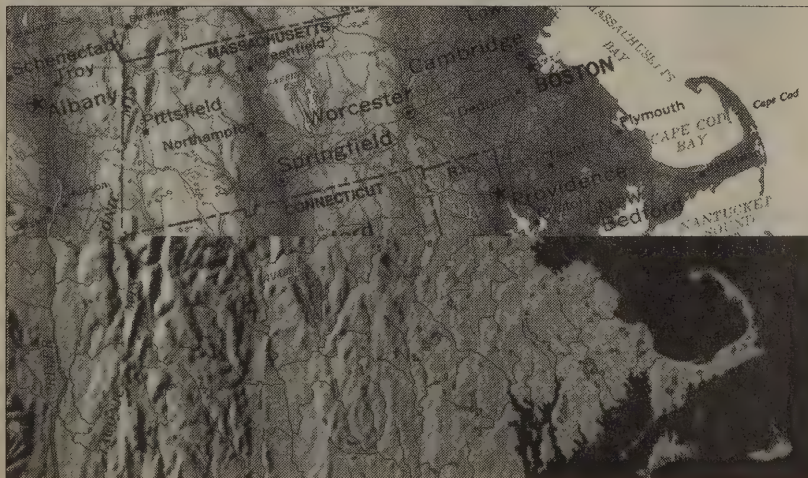
This is the way I like my maps: the knockout first impression followed by detail to pore over, seldom realized as successfully as here. —Don Ryan

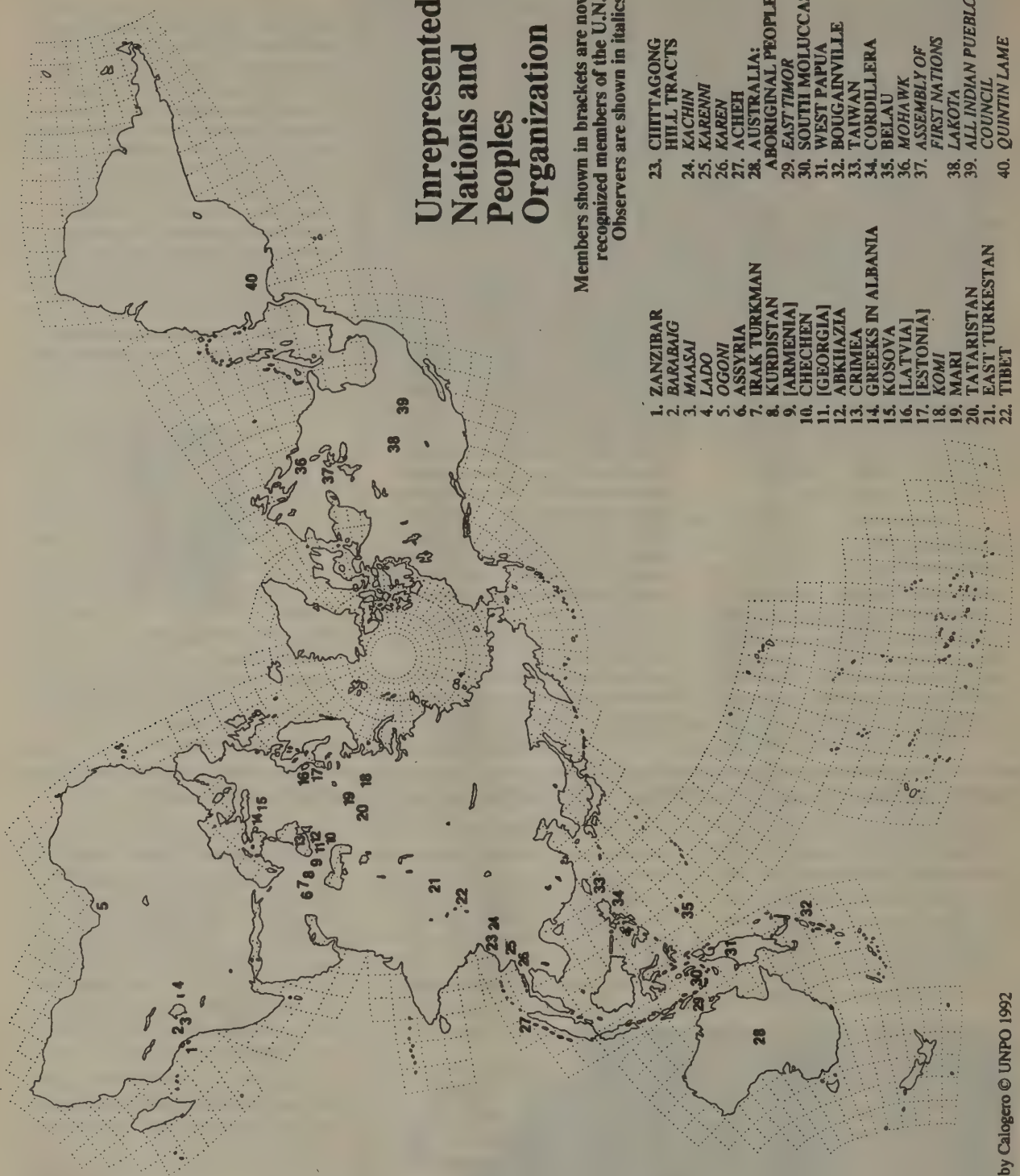
### Landforms and Drainage of the 48 States The United States (except Alaska and Hawaii)

Each 37" x 58"

\$35 each (plain paper; laminated maps are \$60 each). Add \$5 per order for shipping (up to 8 maps per tube)

Both from Raven Maps & Images, 34 North Central, Medford, OR 97501; 800/237-0798





# Unrepresented Nations and Peoples Organization

Members shown in brackets are now recognized members of the U.N.; Observers are shown in italics.

- |                       |                                   |
|-----------------------|-----------------------------------|
| 1. ZANZIBAR           | 23. CHIITTAGONG HILL TRACTS       |
| 2. BARABAIG           | 24. KACHIN                        |
| 3. MAASAI             | 25. KARENNI                       |
| 4. LADO               | 26. KAREN                         |
| 5. OGONI              | 27. ACHEH                         |
| 6. ASSYRIA            | 28. AUSTRALIA: ABORIGINAL PEOPLES |
| 7. IRAK TURKMAN       | 29. EAST TIMOR                    |
| 8. KURDISTAN          | 30. SOUTH MOLUCCAS                |
| 9. [ARMENIA]          | 31. WEST PAPUA                    |
| 10. CHECHEN           | 32. BOUGAINVILLE                  |
| 11. [GEORGIA]         | 33. TAIWAN                        |
| 12. ABKHAZIA          | 34. CORDILLERA                    |
| 13. CRIMEA            | 35. BELAU                         |
| 14. GREEKS IN ALBANIA | 36. MOHAWK                        |
| 15. KOSOVA            | 37. ASSEMBLY OF FIRST NATIONS     |
| 16. [LATVIA]          | 38. LAKOTA                        |
| 17. [ESTONIA]         | 39. ALL INDIAN PUEBLO COUNCIL     |
| 18. KOMI              | 40. QUINTIN LAME                  |
| 19. MARI              |                                   |
| 20. TATARISTAN        |                                   |
| 21. EAST TURKKESTAN   |                                   |
| 22. TIBET             |                                   |

Conjuring the shapes of our devolving world is becoming a planetary preoccupation. Absent the icy logic of the cold war, nation-states are getting hammered from all sides. Ethnic and cultural diversity, long smothered by nationalism and empire, are the driving forces of this fragmentation. Regional economic alliances, the decentralizing potential of new technologies, and the inherent problems of anything that is BIG further nudge the process along.

Here is a support group for all the people who didn't have a seat at the table when the old maps were being drawn. Jeff Greenwald's most recent book, *Shopping for Buddhas* (HarperCollins, 1990), was excerpted in WER #65 (Winter 1989). —Richard Nilsen

by Calogero © UNPO 1992

# The Unrepresented Nations and Peoples Organization: Diplomacy's Cutting Edge

BY JEFF GREENWALD

**M**OMENTS BEFORE ARCHER Antonio Rebollo's flaming arrow sizzled across the night sky, King Juan Carlos of Spain appeared before the 65,000 athletes and spectators assembled in Barcelona's Estadio Olympic.

As head of state, it was Juan Carlos' duty to open the 25th Olympiad. When he did so, though, his announcement came not in Spanish, but in Catalan: the language of Catalunya, the fiercely autonomous nation-state of which Barcelona is the capital.

The king's address, made before some 3.5 billion viewers in 172 Olympic nations, was a gracious concession to Catalunyan independence. It was also emblematic, in a much broader sense, of the direction the world is heading. Nations, peoples and indigenous populations from Alberta to Zanzibar are clamoring for recognition; how world leaders respond to their demands will determine the conflicts and alliances of the coming millennium.

The Catalans are fortunate. King Juan Carlos is openly respectful of their long history, and protective of their autonomy. The same cannot be said for the Basques, however, or the Croatians, or the Karen tribes along the Thai-Burmese borders. It cannot be said for the Mohawks or the Albanians, and certainly not for the Tibetans.

Such populations have long been in need of a powerful ally, willing to coach them in the ring of global realpolitik. Fortunately, such an animal now exists. It is the Unrepresented Nations and Peoples Organization (UNPO), based in The Hague

and presided over by Michael van Walt, an international lawyer.

**A**s a twelve-year-old living in Hong Kong, Michael van Walt devoured every book he could find describing the Chinese invasion and occupation of Tibet. Outraged, he wrote a letter to the Dalai Lama — the spiritual and political leader of the Tibetan people — and pledged to do something about it.

"I think children of that age are often very determined with what they want to do," says van Walt, a wiry, restless man with angular features and a hybrid European accent. "They're very serious about issues that intrigue them. And I was."

The ensuing years witnessed the strength of van Walt's convictions. Moving from country to country with his family — his father was a Dutch diplomat — he continued to study the situation in Tibet. As a teenager in New Zealand, he created an organization to help Tibetan refugee children. Returning to the Netherlands, he founded a Tibetan

advocacy group and published a successful magazine called the *Tibetan Messenger*.

By age 21, he had met the Dalai Lama personally; when the then-little-known spiritual leader expressed a desire to visit Europe, van Walt did the groundwork, organizing the Tibetan monk's first trip to the West in 1973.

Today van Walt, 41, is the sole legal counsel to the Dalai Lama and the Tibetan government-in-exile. He is also the General Secretary of the Unrepresented Nations and Peoples Organization — a self-described "alternative UN" that may revolutionize notions of self-rule and sovereignty.

"I find it absolutely unbelievable," van Walt declared during a recent speech at San Francisco's Commonwealth Club, "that people like the Tibetans, the Kurds, and the elected leaders of Burma are not included in international discussions about their own fates. Each nation should have the right to decide its own destiny, and to manage its own environment."

The UNPO was created to assist peoples and nations which, despite their history and cultural integrity, have little or no representation on the international scene. The organization gives voice to the needs and aspirations of such nations, many of which have existed for centuries — but whose cultures, environments and human rights remain at the mercy of the states that have absorbed them.

The UNPO's advocacy often involves getting these nations' issues raised at the United Nations, monitoring elections and, recently, sending factfinding missions into disputed territories.

The UNPO held its first meeting at the Peace Palace in The Hague in February 1991. Fourteen nations and peoples, including Latvia and Estonia, made up the original roll. Today the organization counts 26 members, comprising nearly 50 million people. The most populous member nation is Kurdistan, with a combined population of some 25 million; the least, according to San Francisco office director Julie Berriault, is probably Belau, an island protectorate in the Pacific.

What all these nations and peoples have in common, and what served as one of the prime incentives for the founding of UNPO, is a keen sense of frustration.

"The representatives of these various peoples felt they were not being given a fair hearing," says van Walt. "It was virtually impossible for them to speak to governments within the United Nations system — even about human rights, the environment, or other issues that affect them. As a result of this frustration level, the desire to start using violence was growing — because that was a proven way for movements to attract attention. So it was decided to create an organization that would find out how to develop dialogues, attract attention, and get governments to listen without using violence."

Many small and/or isolated nations and peoples simply don't have the resources to play hardball in the global arena. Along with providing an international forum, the UNPO addresses this handicap by assisting member nations with diplomacy training, media relations and conflict-resolution skills.

One person who has found such training tremendously useful is Erkin Alptekin, leader of the Uyghur people in East Turkestan.

***"It was decided to create an organization that would find out how to develop dialogues, attract attention, and get governments to listen without using violence."***



Known in the West as the Xinjiang Autonomous Region of northwestern China, East Turkestan was invaded by the Chinese People's Liberation Army in 1949. Since then an estimated 360,000 of Alptekin's countrymen have been killed. The region now holds some 29 labor camps, with nearly 80,000 prisoners; Alptekin asserts that most of these are prisoners of conscience.

The area's natural resources are being diverted to Beijing, while population transfer of Chinese into the territory threatens to make the Uyghurs a minority in their own land. And there is mounting evidence that the Chinese government is using the Taklamakan Desert as a nuclear testing and dumping ground.

"Before joining UNPO, our hopes were slim," says Alptekin, a personable and articulate man with expressive eyes in a round, remarkably unlined face. "The Uyghurs have no one like the Dalai Lama, who is well known throughout the world. We are Muslims, but the Islamic countries could not support us; they had their own problems. And most Islamic countries have a close relationship with China.

"We didn't have many opportunities

to propagate our cause in the West," he says. "The UNPO helped us bring the plight of our people to the attention of the UN Human Rights Commission. And this visit to the United States has provided an opportunity for me to speak with senators and congressmen — and to help raise funds. This is really the only source of hope for our people."

One question bound to arise in any discussion of the rights of nations and peoples not represented by the United Nations is: what exactly *is* a nation? What constitutes "a people"? What prevents the owners of red Mustang convertibles or members of Star Trek fan clubs from deciding that they, too, are a distinct people with rights and privileges of their own?

"A feeling of solidarity and commonality really is the determining factor," agrees Michael van Walt. "But that feeling must be based on objective criteria such as a common language, history or ethnic background. What defines a nation, as distinct from a people, is the degree of political organization, legal status, and history of having been a separately governed entity."

There are 5,000 nations on the planet today — a figure that contrasts dramatically with the fewer than 200 member states of the United Nations. Almost all of the 5,000 nations are centuries or even millennia old, while most of the world's modern states were created within the last 50 years. Jason W. Clay, writing in *Mother Jones*, pointed out that most of today's shooting wars are actually struggles between indigenous nations and the states that have attempted to swallow them. Issues of basic autonomy (language, laws, religious rights, and land use) lie at the heart of almost all these conflicts — which are fabulously profitable for the select few.

"Nearly all the international debt accumulated by African states," Clay notes, "and nearly half of all other

Third World debt, comes from the purchase of weapons by states to fight their own citizens."

In some cases, of course, occupying states are perfectly capable of furnishing their own weapons. One of UNPO's most well-publicized cases is Tibet, which enjoyed a distinct language, government, and culture for at least thirteen centuries — until the Chinese Army invaded in the 1950s. Most of UNPO's other members are much less celebrated, although they face equal oppression and persecution. These include the Chittagong Hill Tracts of Bangladesh; Bougainville, in the Solomon Islands; and the Cordillera, in the northern Philippines.

Along with its 26 full members, UNPO welcomes "observer" nations, which may decide to apply for membership. The criteria for joining are straightforward.

"Any organization which claims to represent a people and wants to join UNPO must reject the use of terrorism as an instrument of policy," van Walt says. "Secondly, they may only use UNPO for the purpose of promoting an agenda which is an alternative to violence. We will not help or support violent activities."

But even this criterion, van Walt qualified, is not always a black-and-white issue.

"The extent of violence used against indigenous people is sometimes so enormous and constant that it would be unfair to say that governments and states can use violence but that the people, in their quest for independence, cannot. An example is the West Papuans, who have been fighting for their freedom with bows and arrows and are being bombed from the air by the Indonesians. To tell the West Papuans that they can't fight back is something nobody in their right conscience could do."

Its realistic world view, as well as its sensitivity to the logistic needs of its members, makes the UNPO an attractive ally. Its membership is growing

— especially from the Americas. Interest has been expressed by the Mapuche of Argentina and Chile, as well as by the Assembly of First Nations: the political body of Canada's indigenous people, represented by the charismatic Obide Mercredi.

At UNPO's General Assembly in August 1991, ten new observer nations sent representatives, including three native American groups. These were the All-Indian Pueblo Council, the Mohawk nation, and the Lakota nation, which took the extraordinary step of declaring its independence from the United States in 1991.

"Indians everywhere, on the 70 million acres of their land, are discussing . . . detailed plans for the renewal of their nation," David Seals of the

Lakota Sovereignty wrote in 1991. "They see this as no more preposterous than what Lech Walesa dreamed about ten years ago, or the Baltic leaders have said this past year."

UNPO's nascent association with the Lakota, though, points to an ironic dilemma that the organization will face with growing frequency in coming years. What happens when a nation or people is polarized into more than one faction? The Lakota Nation is one such case. Another is Kurdistan, UNPO's largest member nation, which sent representatives from each of its two political factions to the UNPO's last General Assembly.

"The two Kurdish parties sat at the same table," recalls Julie Berriault, "but they had only one vote. I don't



If the term "unrepresented nations and peoples" seems ambiguous, that's because it is. The ambiguity works to the UNPO's advantage; almost any disenfranchised population can imagine itself at home inside such an organization. In fact, the UNPO's roll embraces an amazing variety of political agendas. Looking down the list of members and observers one sees occupied countries, federated states, indigenous peoples, colonies, and both ethnic minorities and majorities. All of these groups have, of course, one thing in common: a keen desire for greater representation on the global scene.

UNPO's 26 current members, representing some 50 million people, are:

Abkhazia, Aborigines, Acheh, Albanians in Yugoslavia, Armenia, Assyria, Belau, Bougainville, Chechenskaya, Chittagong Hill Tracts, Cordillera, Crimea, East Turkestan, Georgia, Greeks in Albania,

Iraqi Turkoman, Kurdistan, Mari, South Moluccas, Taiwan, Tataristan, Tibet, West Papua, and Zanzibar. Estonia and Latvia are Supporting Members.

There are currently fifteen UNPO observers. These include East Timor, the Lakota Nation, the All-Indian Pueblo Council, the International Indian Treaty Council, Komi, Karen, Amazonia, Maa-sai, Barabaig, Quintin Lame, and the Mohawk Nation.

UNPO is supported entirely by donations. If you'd like to help, or to receive more information, write to:

**UNPO**  
**347 Dolores Street/Suite 206**  
**San Francisco, CA 94110 USA**  
or  
**Office of the General Secretary**  
**UNPO**  
**Postbox 85878/2508 CN**  
**The Hague, The Netherlands**

know how they decided what to vote. It's very tough, but it comes with the territory. Situations like this will require that the members work out their differences, and present a united front to UNPO. But there's a problem with that. So many of them have been ruled under a 'divide and conquer' system that it's difficult — and a bit presumptuous — for us to tell them to get their act together, when some of these people can't even talk to each other. But other member nations, who have worked out similar problems, can help. Members have to help out other members.

"The whole issue is in process," she conceded. "It will be taken up at our third General Assembly in January 1993."

Eleven years ago, the first "Fourth World Assembly" convened in London. Four hundred representatives from minority nations and small communities attended, and a declaration calling for the decentralization of industrialized states was issued.

But despite its commonsense suggestions and ambitious goals — and the warm feeling of solidarity it nurtured among diverse native societies — the Assembly received scant attention from the global superpowers.

The UNPO has had to face the same hurdle. The bottom line for the organization is, of course, credibility: will mainstream governments take the agenda of upstart nations and peoples seriously?

A partial answer arrived in Estonia in January 1992, when UNPO conducted an unprecedented international conference on the issue of population transfer — an issue that is just now being defined as a form of human-rights abuse. Ten European and Eastern European governments attended the conference, taking part on an equal basis with UNPO's member nations.

"For many of these representatives of peoples," van Walt notes with pride, "it was the first time they were sitting

*There are 5,000 nations on the planet today — a figure that contrasts dramatically with the fewer than 200 member states of the United Nations.*



at the same table with high-level government officials. In the past, you see, most governments have found it politically impossible to meet with representatives of governments that they consider to be opposition groups."

The organization has also drawn acclaim from international observers and national political figures.

"The philosophy and goals of UNPO are most praiseworthy," California Democrat Tom Lantos announced to the House of Representatives in a speech last September. "These peoples have the right to participate democratically in determining their fate, and to pursue their economic, social, and cultural development."

An example of this kind of participation occurred last June, when representatives from four of UNPO's member nations — including the Dalai Lama — traveled to Rio de Janeiro for the Earth Summit. From the point of view of indigenous peoples, the highly touted summit was little more than a bureaucratic morass. As a response, representatives of 92 nations created an alternative conference in Kari-Oca. The central achievement of that anti-summit was the Kari-Oca Declaration, an edict which links environment and development with the rights of first

peoples. The statement will serve as a foundation for further organizing in 1993, The Year of Indigenous Peoples.

With UNPO's growing credibility, the largest obstacle to its long-term success may be hard, cold economics. So far, funds for the organization have come from foundations and private donors, with a small proportion contributed by progressive governments, mostly in Northern Europe. Each member nation must contribute a yearly fee of \$1,000 — a largely symbolic sum which is waived in the case of extremely poor nations. The total full-time staff of UNPO consists, incredibly, of just three people: two in The Hague, and one in San Francisco.

But whatever UNPO lacks in financial solvency is compensated, for the time being, by the enthusiasm of its members and its strong body of interns and volunteers.

"These issues are cutting-edge," observes Berriault, who singlehandedly manages UNPO's Western Hemisphere activities. "A year ago, people were chuckling when they heard the name of our organization; now people are really pricking up their ears." Michael van Walt acknowledges the tremendous work — and financial risk — involved in keeping UNPO afloat. But the rewards, he insists, are commensurate with the trials.

"At the first General Assembly in The Hague," he recalls, "each member said something in their own language, to their own people. A telecast of the event was shown — probably by mistake — in Indonesia. The people of West Papua (occupied by Indonesia since 1963) saw their delegate announce, 'We will accept slavery no more!' And dancing broke out in the streets of West Papua.

"It's a very real thing for them," he says. "That's what motivates me and the staff to do this. We're not just playing around with lofty ideals and theories. For the members of UNPO, these are life-and-death struggles." ☛

## Discover Indian Reservations USA • Indian America



Here are two guides to visiting native Americans on what's presently considered their own turf. **Indian America** gives dates for powwows and other cultural activities, contacts, and a respectable amount of tribal history accented by archival photographs. **Discover Indian Reservations USA** offers only a brief historical paragraph on each tribe, but a lot of contacts for activities ranging from ceremonial dances and guided hikes to rodeos and bingo — illustrated with modern photos. If I were to go visiting, I'd look at both books first. —J. Baldwin

■ **Public Ceremony or Powwow Dates:** There are several powwows and a Sun Dance (Offerings Lodge) held each year. The Wyoming Indian High School Powwow and Yellow Calf Memorial Powwow are usually held in May at Ethete. The Community Powwow is held in June at Arapahoe. The Sun Dance and Ethete Celebration are held in July at Ethete. Arapahoe Language Camp is held at Heil's Corner in July. August is the month for the Northern Arapahoe powwow at Arapahoe. During Labor Day there is a powwow at Ethete, and the Christmas holidays provide a time for powwow celebrations through the New Year in both the Arapahoe and Ethete communities. Call the tribal office for dates and times.

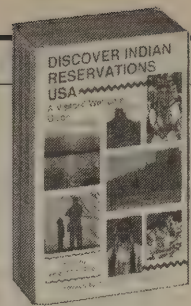
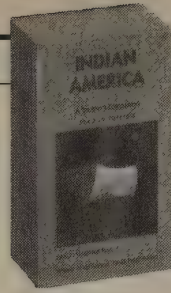
The Sun Dance is open to the public, but extreme courtesy is required not only from the general public but from Indian people as well. Do not take any cameras, recording equipment, sketch pads, or food and drink close to the Offerings Lodge. Women who are on their moon are not allowed close to the Offerings Lodge. —*Indian America*

**Potters working at Oconaluftee Village in Cherokee, North Carolina. —Discover**

### Just GO!

A magazine for those who want to get to know the culture and communities of the places they plan to visit. If you're interested in taking an ecologically sound vacation, where you have a good time and learn more than what the inside of the hotel room looks like, pick up this ecotravel magazine and just GO!  
—Janu Stein

■ This is the real thing. Although I visited Rara Avis [Costa Rica] in the dry season, it rained for part of every day. Annually, this region receives around 150 inches of rain. The humidity does strange and wonderful things. Enormous, green leaves fill the lower reaches of the forest. Their size serves both to drain off excess moisture and to capture any brief rays of sunlight that may chance to break through the clouds and the upper forest canopy. In the 5.5 square miles that make up Rara Avis, 335 species of birds have been sighted, along with sloths, jaguars, tapirs, peccaries, anteaters, monkeys and hundreds of brilliant butterflies. There are 500 species of trees here, including two that have never been recorded anywhere else. Imagine an environment where trees smell like garlic (a chemical response triggered by rain), fruits taste like flowers, and flowers smell like pharmaceuticals. Imagine countless vines, bromeliads, fungi and lichens covering every available organic surface. Imagine the low-level buzz of millions of gnawing, crunching insects, and you will have some sense of the magical and wholly unfamiliar beauty of the jungle.



### Indian America

(A Traveler's Companion)

Eagle/Walking Turtle, 1991; 433 pp.

**\$17.95** (\$20.70 postpaid) from John Muir Publications, P. O. Box 613, Santa Fe, NM 87504; 800/888-7504 (or Whole Earth Access)

### Discover Indian Reservations USA

(A Visitors' Welcome Guide)

Veronica E. Tiller, Editor. 1992; 416 pp.

**\$19.95** (\$22.95 postpaid) from Council Publications, 1999 Broadway/Suite 2600, Denver, CO 80202; 800/848-4909, x 3858

● Anthropologist Phillip McKean, who has studied native dances in Bali, concludes that if it were not for visitors, many traditional dances would be discarded and eventually forgotten. Selling ethnicity to a tourist audience may be an important means of cultural preservation, and at least for the present it may be the only source of cash income for participating villages in Papua New Guinea.

Adds Bates: "We hope our approach to tourism in Papua New Guinea will assist in slowing down the erosion of the culture and environment so that future generations of Papua New Guineans will not lose their 'roots,' and overseas visitors will still be able to experience a phenomenon almost extinct in the rest of our world today."



### Just GO!

Lisa Tabb, Editor.

**\$12.50/year** (4 issues) from Just GO!, 284 Connecticut Street, San Francisco, CA 94107

## Finding & Buying Your Place in the Country

We've liked this book a lot since it first appeared in 1974. Here's the third edition, thoroughly updated and better than ever. The book continues to be a great example of doing things right; not only is the minutely detailed information exactly what you need, it's reinforced with encouragement, caveat, sage advice, demystification, and a good education in the often shady real-estate game. Supporting the main event is a glossary of arcane terms, a selection of sample forms, and a useful bibliography (much of it available free) of homework. Most of the information pertains to non-country Places too. It's one of those rare books that would be difficult to improve. —J. Baldwin

■ A small fee buys a permit for the construction of an outhouse and later installation of a septic tank. Contrary to popular belief, outhouses are not outlawed by many health departments. In many areas if you do not have adequate running water under pressure to your house and the outhouse is not located within 200 feet of an adjacent residence, you are permitted to use an outhouse (privy).

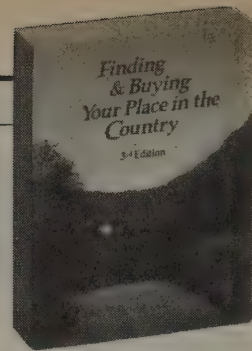
■ Don't be afraid of the tax assessor or his

or her office. All files are open to the public, and the chances are that the person who appraised your land will be in the office and available for discussion. Ask what factors the assessor considered in appraising the property, including improvements, recent sales in the area and the price being asked by the seller for the property. The assessor can give you a rough estimate of how much your taxes will probably increase, based on the amount you intend to pay for the land.

In a subtle way, ask if the assessor thinks the seller's asking price is reasonable. His or her answer and analysis of the property might give you some valuable information to use when negotiating the purchase price.

■ The importance of understanding easements and knowing when and where they are located cannot be overstressed. Beware of the real estate agent who tells you, "Don't worry about getting an easement. The former owner of this land has been using it for years. Everybody is real friendly. Nobody around here ever gets easements." Tell the agent that if nobody cares if you use the road, then he or she should have no problem getting the landowners to sign deeds granting such an easement formally.

Think about the future. The people who



### Finding & Buying Your Place in the Country

Les Scher and Carol Scher, 1992; 409 pp.

**\$24.95** (\$28.95 postpaid) from Dearborn Financial Publishing/Order Dept., 500 N. Dearborn, Chicago, IL 60610; 800/322-8621 (or Whole Earth Access)

now own the land you cross might not care whether you do so, but the next owners might not be so gracious. Or the present owners might not like your looks and decide that they are not going to treat you as they did the last owners. All they have to do is put up gates and tell you not to cross their land if you don't have deeded access. These situations are very common in the history of real estate disputes.

● If you are moving to an isolated area, your neighbors might be more important to you than if you are living close to town.

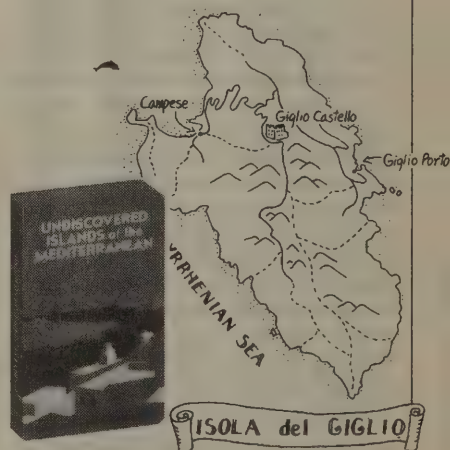
## Undiscovered Islands of the Mediterranean

Sons and daughters of Odysseus and Penelope will find familiar sailing on the waters charted in this enticing guidebook. The "Undiscovered" in the title is sort of a reverse Columbianism: of course the islands are already occupied — some for millennia — but they are unknown to the tourist hordes, especially North Americans. Some of the destinations are unfashionable enough (like Île du Levant, off the Côte d'Azur) to share an island with a military base. Many are just now recovering from decades of economic depression and abandonment. From France to Turkey, these islands combine the special appeal of isolation in a warm blue sea, with a palpable history reaching to the very roots of Western civilization.

In competent guidebook fashion, we are pointed to walking trails and given ferry directions. Recommendations for lodging and dining are also offered. The authors' gift to the reader is the transparency of their prose style, a graceful informality perfectly suited to the islands' ambiance: unadorned, intrinsically beautiful. Illustrated with photos and spare, charming maps. Rapture of the deep strikes again! —Don Ryan

■ Even in late September, the midday heat and intense light discourage exploration; dawn is the perfect time to watch the island come to life. First to appear are the farmers who bring their produce to stores that have pastel-tinted walls faded by decades of sunlight. A black goat grazes against the remains of a mottled green wall that glistens from the rays of the early morning sun. Old women appear from behind ornately carved doors to wash their steps with buckets of water, a tradition performed for centuries. Next, the cat population begins to stir, then to amble down toward the waterfront for the arrival of the fishermen with the daily catch. Birds flutter through the empty windows of a now-abandoned Greek church. Inside are water-damaged frescoes and exposed brick columns that are hauntingly beautiful. Around 8:00 a.m., small, happy groups of children walk down the quiet streets to their elementary school behind the yacht harbor. Their black jackets, shorts, and newly pressed white shirts are spotless. Some of the youngsters have put an elegant finishing touch to their uniform, a starched white handkerchief in the tiny jacket pocket. The waterfront cafés fill up for morning tea, and then with the arrival of the fishing boats, the cats are fed and the midday meal is delivered in handmade baskets to the

restaurants and hotels. The day is in full swing in Çunda; life moves with gusto and much pleasure on this now shimmering Turkish island.



### Undiscovered Islands of the Mediterranean

Linda Lancione Moyer and Burl Willes, 1990; 220 pp.

**\$14.95** (\$18.70 postpaid) from John Muir Publications, P. O. Box 613, Santa Fe, NM 87504; 800/888-7504 (or Whole Earth Access)



If you have children, you will probably want neighbors with children in the same age group, particularly if you plan to live there permanently. On the other hand, if you don't have children, you may not want any nearby children who will climb your apple trees, or adolescents, who will race their cars. If most of your neighbors are young couples, you should expect an increase in the number of children in the area.

A unique problem with neighbors occurs in some areas where ranching is practiced. Many states still observe the "open range" law, which permits animal owners to let their livestock roam free. The burden of fencing in land is on any landowner who does not want the wandering herds to enter his or her property. Thus, if you buy a place next to a cattle ranch and you don't want cows wandering through your land, you will have to build a fence to keep them out. This is a costly project and should be figured into your purchase price.

**Phreatophyte examples:**



Rabbit brush indicates water within 15 feet of the surface.



Arrowweed indicates good-quality water 10 to 20 feet below the surface.



Elderberry shrubs and small trees indicate water within 10 feet of the surface.



Black greasewood indicates mineralized water 10 to 40 feet below the surface.

**The Traveller's Tree**

Patrick Leigh Fermor, by turns youthful adventurer, linguist, classicist, and war hero, was the quintessential "gifted amateur" when he set out with two companions, in the late 1940s, to journey through the long island chain of the West Indies.

He was the ideal traveler: inquisitive, humorous, interested in everything. His budget, and curiosity for the lives of the Creole, disposed him to live among them, but introductions from home afforded him also time among the governors and administrators in colonial manor houses. His sense of history runs deep; he encountered 450-year-old cultures which he calls young. He reminds us how everything is connected by time's threads and sinews.

Fermor was observant of architecture and of fashion and influence. He knew how to notate music and sings us overheard melodies and recites the latest Calypsos. He shows immense empathy for the Negroes and gives a long and sympathetic description of Haitian Voodoo — but is skeptical about Jamaican Rastafari. His ear for language heard the connections with West Africa.

This is as complete and evocative a description of a culture, of an archipelago of cultures, as I have ever read. But a word of caution: if you are planning a trip to the Caribbean, this is not a guidebook to take. This is to read if you will never be able to go. —Don Ryan

Geographically, the Caribbean archipelago is easy to split up into component groups. . . .

No such brisk summing-up can be formulated for the inhabitants of these islands: the ghostly Ciboneys, the dead Arawaks and the dying Caribs; the Spaniards, the English, the French, the Dutch, the Danes and the Americans; the Corsicans, the Jews, the Hindus, the Moslems, the Azorians, the Syrians and the Chinese, and the all-obliterating Negro population deriving from scores of kingdoms on the seaboard and hinterland of West Africa. Each island is a distinct and idiosyncratic entity, a civilization, or the reverse, fortuitous in its origins and empirical in its development. There is no rule that holds good beyond the shores of each one unless the prevalence of oddity, the unvarying need to make exceptions to any known rule, can be considered a unifying principle. The presence of religious eccentrics like the Kingston Pocomaniacs and the adepts of Voodoo in Haiti and the survival of stranded ethnological rock-pools like the Poor Whites in the Islands of the Saints or the semi-independent hospodarate of the Maroons of the Jamaican mountains — all this, and the abundance and variety of superstitions and sorceries and songs, of religious and political allegiances, and the crystallization of deracination and disruption into a new and unwieldy system, almost, of tribal law — all this excludes any possibility of generalization.

The skipper heaved the sloop's bowsprit round and pointed it at the fading silhouette of St Eustatius. The wind was pierc-



**The Traveller's Tree**

(A Journey through the Caribbean Islands)  
Patrick Leigh Fermor, 1950, 1984; 366 pp.  
**\$8.95** (\$10.95 postpaid) from Penguin USA/Cash Sales, 120 Woodbine Street, Bergenfield, NJ 07621; 800/253-6476 (or Whole Earth Access)

ingly cold, and as the ship leapt forward, we dug out a half-empty bottle and lowered comforting stalactites of whisky down our throats. Night fell, and the rain stopped. The heads of the Negroes, who had all taken refuge under a tarpaulin like some tremendous recumbent group of statuary before its unveiling, began to appear again round the edge. The two nearest to us were talking to each other in an incomprehensible language that was neither pidgin English nor Créole. Many of the words sounded like Spanish, but the flow of the language was suddenly thickened by noises that were guttural and uncouth. Seeing that I was listening, one of them whispered, "Papia poco poco bo tende" and their voices dropped. But I understood, with excitement, that they were talking Papiamentu, that almost mythical compound of Spanish, Portuguese, Dutch, French, English and African dialects evolved by the slaves of Curaçao and the Dutch islands of the Southern Caribbean.

# FIREARMS:

## No Right Is An Island

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*The mad mob does not ask how it could be better,  
only that it be different.*

—Martin Luther

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“It’s just  
a right we can’t afford anymore.”

The speaker was a young man in jeans and a red plaid shirt. He was addressing a group of about fifty people, pretty well assorted in age and ethnicity, although there was a middle-class feeling about them. As far as you could tell, red-shirt was reaching about half the room; the rest were distinctly unhappy with his point of view.

“I’ve heard all the arguments,” he was going on, “and in my mind, they simply don’t outweigh the negatives. People will say, ‘Responsible owners don’t create the havoc,’ and they’ll tell you that getting out into the wilderness is an important part of our heritage — they’ll say that there are things about America that make us different, that give us a legitimate right — but I don’t buy it. And I don’t buy the argument that confiscation is unreasonable search and seizure — sure, people have a lot of money invested — but it’s not my fault or the government’s fault if you choose to invest in something harmful, something you don’t need and you can’t justify.”

There was a lot more, but it was obvious that I’d wandered into the wrong meeting, so I left. Besides, I don’t even own a mountain bike, so what do I care about the pros and cons of banning

them? They’re ugly, they represent a danger to innocent bystanders, and I don’t understand why people want to have them and use them. It isn’t something I lose any sleep over, but I guess if it came down to voting about it, I’d go along with a candidate who wanted them banned.

Actually, I wouldn’t. I just wanted to see if I could upset a few people. Mountain bikes aren’t a good analogy to guns: after all, guns are only dangerous to people and animals; bikes tear up the countryside, too. Just kidding!

The point is: most of the people I talk to about gun control (we might as well get that remarkably meaningless phrase out in the open) seem to feel strongly about it, but they don’t give the impression that they’ve thought about it at any length. The two basic positions boil down to: “Them goddamn lib’rals are after my guns, and if they get my guns, it’ll be my testicles next!” and “Did you know that X thousand people were killed in the US alone last year by guns? Why aren’t they illegal?” Neither point of view is especially rational, although both are based loosely on facts. Neither point of view is particularly liberal or even especially smart.

Why isn't "gun control" any better an idea than, say, the gun-rights peoples' central idea — one typically painted by its opponents as a program of free assault rifles for all third-graders? Let me ask you this: are you really comfortable with the government? Do you drop off to sleep at night murmuring, "Boy, those folks in Washington sure have my best interests at heart?" Are you convinced by either evidence or principles that we have sound, competent leadership, carefully safeguarding your cherished freedoms? Are you completely insane?

National governments have, shall we say, their own agenda. Whatever it is that gets laws passed and regulations promulgated, it absolutely isn't a deep and abiding affection for the principles of individual liberty. Governments are driven by realpolitik, not by any need or desire to do what's right. Whether you're an American living under George Bush or a Brit living under George III, your government will only be as concerned with you and your rights as it has to be. What forces a government to pay attention to you and me — our guns? Hardly. The armed citizen is no restraint on anybody except another citizen, at least in a huge, hyperindustrialized country. What restrains a government is law, and fear of the consequences of breaking it. And the primary law we have to restrain our government is the Constitution. That's why any program that chips away at the Constitution is illiberal and ill-advised, no matter how apparently obvious the benefits and how far from hurting you, personally, the program might seem to be.

Think about other civil-liberties issues: abortion, separation of church and state, equality before the law. What would your gut reaction be if I suddenly started advocating changes in the Constitution to restrict those freedoms?

Suppose somebody were seriously pushing an amendment to define conception as the beginning of life?

Or what if I started out talking about some terrible social ill? Take crime in the streets. What if I kept up a barrage of emotional messages, showing you over and over again how terrible it all is, especially since our elected officials don't seem to be able to do much about it. And what if I then offered you a simple, straightforward solution, one that didn't require you to do a damn thing except vote for me? And what if that solution was allowing police to stop and search people who fit a "high crime profile"?

All of a sudden, some warning lights go on. Or at least I hope they do. Maybe you don't fit the profile, maybe there's little or no chance that your rights will be affected. But let's say it works — crime in the streets really does drop, even by a bit. There's another election coming up. How about applying the same concept to — I know: white collar crime! "Today, the Federal Bureau of Criminal Research released its executive criminal profile, encouraging police to stop and question well-dressed white males between the ages of 45 and 60. Thousands of arrests were reported in New York alone."

Or suppose I just started lobbying for a new category of possession crimes. That last example is pretty absurd; nobody's going to institute stop-and-search operations to deal with insider trading; it'd tie up too many police officers and flood the courts. But I can easily imagine a campaign to ban mountain bikes or snowmobiles or jet skis. And there are people who'd support it, just as there are people who support campaigns to ban firearms. And thousands more who have no real interest one way or another — people who don't set foot in the mountains or the snow or the water — would watch the 60-second spot on

**Nothing proposed to date  
would be "gun control."**

**Objects are not amenable  
to control by laws;  
laws regulate the  
behavior of individuals  
and governments.**

**This country has an  
immense collection of  
laws designed to control  
narcotics, and those laws  
easily constitute the  
greatest failure in the  
history of legislation.**

*Mr. McConnell is a software engineer and an uninvited social theorist — uninvited in the sense of "Who asked you?" He lives in the Midwest, where he commits certain suspicious and unfashionable acts — these belied by a thin veneer of probity. He would be popular with no one if they knew what he was actually thinking.*

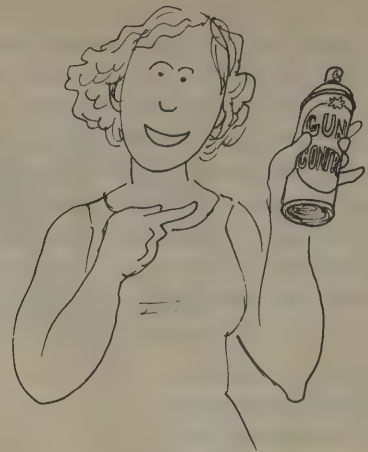
—James Donnelly

CNN and file away a simple-minded, snapshot opinion, made on the basis of which side's spokesperson was more emotionally convincing. Everywhere one of these laws made it onto the books, a whole category of acts — including the passive act of having an object sitting in your garage — would become crimes. Crimes: the same word we use for acts of murder, rape, and savings-and-loan fraud. The simple fact is, any act can be made a crime; only the Constitution stands between you and some vocal, well-heeled (and probably well-meaning) set of zealots. And if you join with such a group on one issue, you forfeit your right to squawk when somebody else comes at you from the other side.

What the public innocently and governments cynically call "gun control" is as inconsistent with a philosophy structured around a belief in individual freedom and dignity as right-to-life legislation would be. It doesn't necessarily follow, though, that it would be ineffective. Banning the private ownership of firearms might achieve some of the objectives claimed for it — but first, it would have to be possible, something that is questionable in the extreme. And such a success would have to fly in the face of experience with virtually all similar experiments.

Note first of all that nothing proposed to date would be "gun control." Objects are not amenable to control by laws; laws regulate the behavior of individuals and governments. This country has an immense collection of laws designed to control narcotics, and those laws easily constitute the greatest failure in the history of legislation. We have a bewildering array of laws designed to regulate the ownership and use of automobiles, yet thousands of people are killed by cars every year. Why aren't they illegal? International conventions exist to prevent nuclear proliferation, but countries that want the bomb get the bomb. By any pragmatic standard, the least effective thing you can do about a dangerous object is to pass a law forbidding its possession.

What gets proposed periodically under the name of gun control is usually some version of a licensing law, designed to make it more difficult for "harmful people" to legally own a firearm. Many such laws exist already; for example, where I live, you have to get a permit from your local police if you want a handgun. In theory, they check your background to see if you're a convicted felon or mental patient and if you are (again, in theory) you don't get your permit. It's not clear to me what procedures they actually follow; the original check performed on my background took exactly the two weeks they said it would. A similar check on a friend took two days. Since neither of us is a felon or psychopath, it's hard



James Donnelly

**Laws seeking to control guns  
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"work" as meaning "cut down  
on violent crime."**

to tell if the law and the procedures behind it worked — but at least it functioned up to its specifications. It allowed two citizens who are "harmless" by its definition to obtain firearms which they were legally entitled to obtain, with only a minor level of inconvenience and interference. So what's wrong with that? This is the kind of law that gun rights groups fight against savagely. And it's the kind of law that the anti-gun groups call inadequate. What's the problem here?

From the standpoint of the gun-rights people, license laws are objectionable mostly because they create a base of gun-ownership information, information that could be used later to locate and confiscate guns banned by subsequent legislation. While this isn't completely illusory, it isn't a good public argument. After all, that base of information could be used for some good purposes — investigating homicides, returning your guns to you after they'd been stolen. The fallback position is that this kind of thing — including the "cooling-off period" laws that call for a wait of some days or weeks before taking delivery — is just a foot in the door for wider, more restrictive measures, leading eventually to total bans. This argument, while still not particularly sophisticated, at least serves to separate the

opposition's sheep from its goats; those that really want a complete ban can usually be prodded into admitting it at this point in the discussion.

The flip side of the coin is that it's hard to see where the license laws have done much good. I'm not a psychopath, but the guy who breaks into my house and steals my gun may well be. Under those circumstances, the law designed to keep guns out of his hands hasn't done dick. And what if my third-grader, deprived of his legal right to own an assault rifle by the short-sighted commies at Handgun Control Inc., gets ahold of my Smith and Wesson and takes out his gym teacher, or himself, or me? If we return to the original premise — that these laws are designed to make it more difficult to own firearms — and if we note that there are more of these laws around than there were even a few decades ago, how do we account for a nationwide increase in firearm ownership? No matter how you look at it — gun rights, gun control, or simple performance — background-check licensing laws are open to criticism.

Another form of gun law that gets a lot of press is the outright ban on a particular kind of weapon.

Most of us have heard the phrase "assault rifle" and have a vague notion that our inner cities are full of drug-crazed thugs carrying these heinous devices. There's the fuzzy idea that government made the things illegal, or something. You may also have heard that your local police need new pistols to achieve parity with the criminal element. And we all know about the deadly and insidious Saturday Night Specials, now thankfully banished from our shores. In fact, these categorical bans range from the ludicrous to the grotesquely cynical — they constitute an unbelievable misuse of public money, and they have an even more pathetic performance record than the license laws.

Assault rifles, per se, have been "illegal" for a long time. A genuine assault rifle is a military weapon of a kind first seen in the second world war. It uses a smaller, shorter-ranged bullet than the traditional infantry rifles of the first half of the century, meaning that the gun can hold more rounds and the soldier can carry more of them. It's usually a selective-fire weapon, meaning that the user can select whether the gun will function as an ordinary, one-trigger-pull, one-shot rifle or as a machine gun. This feature means that ownership of a true assault rifle

## In the Gravest Extreme

An ex-policeman, Massad Ayoob currently writes on the topic of the use of force by police and civilians. This book, arranged in topical chapters such as "The Dangerous Myth of Citizen's Arrest," "High Price of Handgun Machismo," and "The Aftermath," is unpleasant reading. But the roughness and unpleasantness are probably calculated and certainly necessary. The television image of shootings is all wrong — individual police officers don't shoot two or three people, return to the normal routine next day with no investigation, and never lose a minute's sleep. People don't recover instantly from gunshot wounds. And civilians don't blow away muggers and burglars and get a pat on the back from the cops. As Ayoob makes clear (and the book's title suggests), you have the legal right to kill someone only in the gravest extreme and, particularly if you own such an extremely efficient device as a modern firearm, you have both a legal and a moral responsibility to know when lethal force is justified. If you keep a gun for defense or you're thinking of getting one, I'm not kidding when I say that the sooner you read *In the Gravest Extreme*, the better. —Joe McConnell

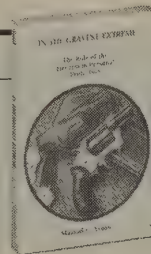
### • When is Lethal Force Applicable?

The classic rule is that the right of self-defense begins when the deadly danger begins, ends when the danger ends, and revives when the danger returns. As we have seen, a killing that has taken place after the threat or the crime itself cannot be claimed as self-defense, if only because at that point no real challenge remains to defend against. At the other end, violent defense is not justified a moment before the attack is about to begin.

An advance threat may be met with killing force only when that threat occurs immediately prior to what the slayer can reasonably anticipate will be a murderous or crippling assault against him. "Do I have to wait for my attacker to fire the first shot?" This seems to be the most common self-defense question from both police and civilians.

The answer is no. If you have real reason to believe that the man is about to commence an assault, you are fully within your rights to strike the first blow. The pre-emptory first strike is a strategy as applicable to individual conflict as to military theory.

• The assailant must not only have shown that he is willing to kill or maim you: he must be apparently able to do so at the moment you pull the trigger. The "pre-emptive



## In the Gravest Extreme

(The Role of the Firearm in Personal Protection)

Massad F. Ayoob, 1980  
(Police Bookshelf); 130 pp.

**\$9.95** (\$13.95 postpaid) from Loompanics Unlimited, P. O. Box 1197, Port Townsend, WA 98368

strike" concept — you get him before he gets you — applies only if he actually is near enough to get you.

■ I recommend warning shots only for police, and only to halt a fleeing felon, and then only under certain circumstances. A civilian has no need to fire warning shots when the criminal is attacking him — indeed, it will only cost him a precious moment and a precious cartridge. If he has justification to shoot, he should shoot to stop; if deadly force is not warranted, the gun should remain silent, period.

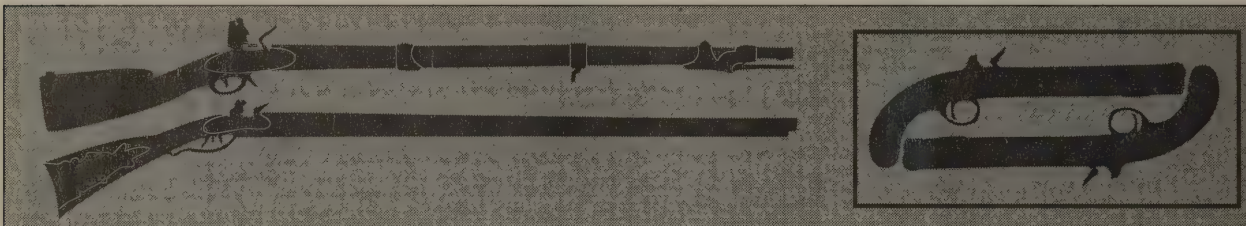
is off limits for anyone without a special, expensive federal permit. Some states ban ownership of selective-fire and fully automatic weapons, federal permit or not. Furthermore, even though an assault rifle — the notorious AK-47 and the M-16 are examples — is smaller than the infantry rifles it replaced, it's hardly a concealable weapon. Inner-city criminals may be better armed than they used to be, but the statistics on guns used in crime still show the ordinary — the remarkably ordinary — handgun to be the overwhelming favorite. In all of 1990 and 1991, there were no — repeat, zero — homicides with rifles of any kind in Washington, DC. Why then the outcry over assault rifles? The reason lies in market forces.

The People's Republic of China has a couple of high-efficiency, high-throughput small-arms manufacturing facilities. In the seventies, when they were anticipating a war with the Soviets, the Chinese ramped up to arm large numbers of their people with copies of Soviet weapons. When the border trouble cooled off, somebody noticed that there were large numbers of Americans with money, Americans who had seen countless hours of media showing tough, determined, macho third-worlders running around

with AK-47s, Americans who, of course, couldn't legally own a real, selective-fire AK, but who had a constitutional right to own a plain old semiautomatic rifle. Voila! Hard currency!

One of the many myths of gun control is the belief that any idiot can turn a semiautomatic rifle into a machine gun. This is not true; but it's certainly true that machinists can easily re-tool a factory to manufacture a semiauto version of what used to be a selective-fire AK-47 clone. And so the Chinese did, making many thousands of inexpensive, savage-looking but quite legal "assault rifles" for the American market. And while few professional criminals found them attractive, lots and lots of perfectly legitimate shooters bought them; and a few genuine nuts. Some of those nuts used them to shoot up neighborhoods, schoolyards, and their places of employment, bringing themselves instant media attention and bringing their cheap, easily obtainable, pseudo-assault-rifles to the attention of politicians desperately in need of reelection issues.

Now, the last thing a federal politician of any stamp wants to do is actually do something. And a real gun ban is one of the things no sensible politician really believes can be done. But if there were just some

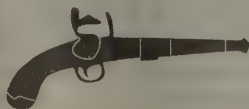


## Thinking of Buying a Gun?

The point of this article is not "Go out and get a gun." It is "Think twice before trashing the Constitution." But if you are considering a firearm for self-defense, here are some points to consider:

### Legalities

Find out if you have a legal right to own one. Depending on where you live, how old you are, and your legal status (that of a felon or mental patient, for example), you may not be allowed to own a gun, or a specific kind of gun. Your local police department is the place to find out.



### Education

Preferably before or at least immediately after buying your gun, take a course in using it. Conservation clubs, the NRA, and sometimes even police agencies offer introductory courses in safety and marksmanship. Ask the dealer. Television to the contrary, all Americans are not born with the innate ability to handle guns.

### Get the Right Gun

This seems so obvious, but it's so often violated. If you're a small person, with little or no experience with guns, and you want a weapon to keep in your bedroom for defense, you don't want a .44 magnum revolver with a ten-inch barrel. And yet, less-than-scrupulous gun dealers have been known to recommend whatever firearm has been in their inventory for too long. There's a loud dispute at the moment over whether a revolver or an automatic pistol is the best gun for the beginner, but here's my personal opinion: get a revolver in .38 special caliber with a four-inch barrel. A revolver is almost foolproof in operation: all

way . . . some symbolic effort we could appear to be making . . . something that wouldn't cost us too many votes on either side . . .

So the Bureau of Alcohol, Tobacco, and Firearms applied regulatory action that, if you didn't look too closely, would seem to be a ban on assault rifles. In fact, it banned *import* of a particular description of weapon — not its ownership, or even production within the US. And it left so many loopholes that, within a few months, the same weapons, equipped with a slightly different stock, were right back on the market. I hadn't realized that it would hurt less to be shot with a gun that didn't have a pistol grip; boy, was that a load off my mind.\*

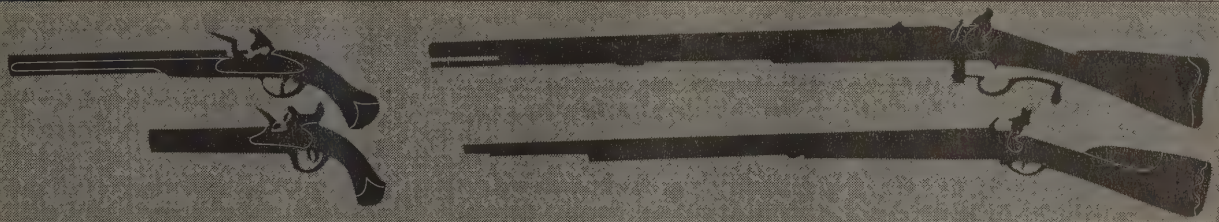
And about those Saturday Night Specials (small, cheap, inaccurate, concealable handguns, usable only for dire purposes and, apparently, only on Saturday nights)? Well, our government did take action

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\*The other major benefit of the assault-rifle hoopla was the self-outing of the firearms-illiterate; all over the country, public figures aired their abysmal ignorance of the topic. My favorite was an East Coast pol who called for a ban on the "deadly Garand pistol" — never mind that the Garand is a World War II-era rifle, nine-and-a-half pounds and three-and-a-half feet long.

against them, mostly of the "assault rifle ban" variety — imposing import restrictions. And today, guns fitting that description are still the most commonly used tool of the dread inner city criminal. Once again, your money was spent on a problem that you said you wanted solved and nothing happened. Actually, worse than nothing — because you didn't get any reduction in violent crime and another chip got knocked off the Constitution. Another one of those "Oh well, I know what it says in the Bill of Rights, but this is an emergency" rationalizations got past you.

Laws seeking to control guns have not worked, are not working, and aren't going to work — not if you define "work" as meaning "cut down on violent crime." And because they create crime out of nowhere — make actions that were legal yesterday a felony tomorrow — they lie squarely across the path of what most Americans at least say they believe in. But nobody would deny that there's a problem to be dealt with. People are getting killed, especially poor people, and at rates that make the word "genocide" swim up to within rippling distance of the surface. Are there things we can do, things we should be doing? Well, yes.



you do is pull the trigger. Most automatic pistols have an array of levers and buttons, conducive to fumbling around with in the dark, especially when you're scared shitless. And although conventional wisdom says that a shorter barrel is better for a defense gun (it's harder for an attacker to get it away from you without getting shot), the four-inch barrel will make your gun at least reasonably accurate at the shooting range, whereas a two-inch will just be frustrating. Why a .38 special? It's the lightest-recoiling revolver cartridge that's even close to acceptable in terms of effect. Although any gun can kill almost anything, you don't want to bet

your life on .22s, .25s, .380s, and other pocket-pistol cartridges.

### Get a Good Gun

Quality control in firearms manufacture sucks. Whatever you do, don't buy a cheap gun. Buy one from a manufacturer you've heard of (Colt, Smith & Wesson, Beretta, etc.) and be prepared to have some work done on it before it works properly. If you buy a cheap pistol, be prepared for it not to work at all.

### Shoot It

Don't buy a gun and throw it in your dresser drawer. Join a club, find somewhere to practice with your gun — and do it! You may

have a right to own it, but you have no excuse for being incompetent with it.

### Secure It

If you allow your gun to be stolen or found by kids, you're suddenly part of the problem. If you have kids in the house, you must lock up your gun. In some places, that's a law, but everywhere, it's just common sense. If someone breaks into your house while you're not there (far more likely than when you're home) and is able to find and take your gun, your ownership of it has been worse than pointless. ☹

## Giving Up the Gun

Noel Perrin, a professor of English (not Asian history), wrote *Giving Up the Gun* as a *New Yorker* article in 1965 and expanded it to a book in 1979; in 1992 it's still the most concise and convincing argument I've seen against technological determinism. Did the Japanese really abandon guns? Did they have enough experience with guns to know what they were giving up? How did they go about this selective disarmament? What did it cost them? Was Tokugawa Japan such a strange place that abandoning firearms was an irrelevant anomaly? The answers, carefully researched yet casually presented, point back at us — caught up in our latest military and technological rushes. Whatever direction we go, we're making a choice. —Donald Day

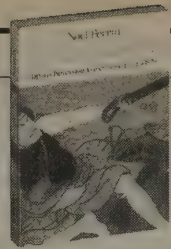
None of this proves in the least, to be sure, that what the Japanese once did with guns the whole world could now do with, say, plutonium. Japan's circumstances in the seventeenth century were utterly different from those of any military power now.

What the Japanese experience does prove is two things. First, that a no-growth economy is perfectly compatible with prosperous and civilized life. And second, that human beings are less the passive victims of their own knowledge and skills than most men in the West suppose. 'You can't stop progress,' people commonly say. Or in a formulation scientists are especially fond of, 'What man can do, man will do.' Once he learns how to alter the DNA code, the theory goes, it is inevitable that he will alter it. Once the technology exists for supertankers, there is no going back to small tankers, much less sailing ships. If computers in the year 2001 are more efficient than men at doing most of the processes lumped together under the term 'thinking,' then computers will do most of the thinking.

This is to talk as if progress — however one defines that elusive concept — were something semidivine, an inexorable force outside human control. And, of course, it isn't. It is something we can guide, and direct, and even stop. Men can choose to remember; they can also choose to forget. As men did on Tanegashima.

Soon after Nagashino two conflicting attitudes toward guns began to appear. On the one hand, everyone recognized their superiority as long-range killing devices, and all the feudal lords ordered them in large numbers. At least in absolute numbers, guns were almost certainly more common

in Japan in the late sixteenth century than in any other country in the world. On the other hand, no true soldier — that is, no member of the *bushi* class — wanted to use them himself. Even Lord Oda avoided them as personal weapons. In the ambush in which he died, in 1582, he is supposed to have fought with his great bow until the string broke, and then with a spear. The following year, during a battle in which something like two hundred ordinary soldiers were hit by artillery fire, the ten acknowledged heroes of the battle made their names with swords and spears.



### Giving Up the Gun

(Japan's Reversion to the Sword)  
Noel Perrin, 1979; 1988; 136 pp.

Out of stock; available fall 1993 from David R. Godine Publisher Inc., 300 Massachusetts Avenue, Boston, MA 02115; 617/536-0761

## Introduction to Criminal Evidence

Here are the rules. I was surprised at how little I really knew about them, and even more surprised at how little a selection of my friends knew. Here is the scoop on such matters as "coddling" criminals, *Miranda* rights, search and seizure, what lawyers do, and how the system works. I suppose you don't really need to know all this unless you have been or are intending to be naughty, but, um, I found it fascinating. The information has been expertly translated from Legalese. —J. Baldwin

### Reaction to Accusation

An adoptive or implied confession may occur when an unmistakably accusatory statement is made in the suspect's hearing and he either remains silent, which creates an inference that he adopts the accusation as true, or makes an equivocal response instead of the strong denial that would normally be expected from an innocent person. It may also occur when the suspect engages in affirmative conduct from which his admission of the accusation's truth can be inferred.

#### Example A:

"This man raped me!" The man stares at the ground sheepishly and says nothing. His silence constitutes an implied or adoptive confession.

#### Example B:

"This man raped me!" The man replies, "Now wait a minute. That's not exactly true. It takes two to tango, you know." This equivocal response gives rise to an implied admission.

#### Example C:

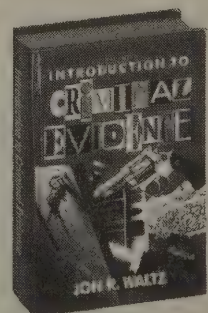
"You have sexually molested our daughter!" After his wife makes this accusation the suspect consults a psychiatrist. There is an implied admission in this conduct.

### The Impact of *Miranda*

Of course, when a person is in police custody his silence may reflect a desire not to

make a statement. In *Miranda* the Supreme Court said, "[I]t is impermissible to penalize an individual for exercising his Fifth Amendment privilege when he is under police custodial interrogation. The prosecution may not, therefore, use at trial the fact that he stood mute or claimed his privilege in the face of accusation." In short, silence or an express claim of the Fifth Amendment during custodial interrogation is not admissible against an accused. Neither is his reaction, or lack of one, to an accusation made during a judicial proceeding, such as a preliminary hearing. Courts take the common sense approach that such charges do not naturally call out for a denial. For that matter, some judges can be expected to rule that nothing can properly be read into pre-arrest silence in the face of an accusation.

However, the prosecution is free to introduce evidence of an accused's post-arrest silence to challenge his insistence at trial that he cooperated with the authorities at the scene of his arrest.



### Introduction to Criminal Evidence

Jon R. Waltz, 1991; 460 pp.

**\$38.95** (\$42.95 postpaid) from Nelson-Hall/Order Dept., 111 N. Canal Street, Chicago, IL 60606; 312/930-9446

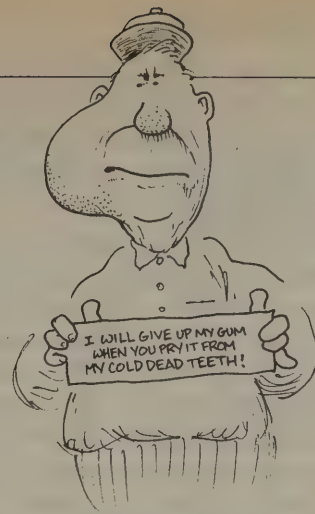


First of all, we need to act our age. When a two-year-old bumps his head on the table, he cries and smacks the table. He doesn't say, "Gee, I guess I should look where I'm going." He just strikes out at the thing — the object — that hurt him. If we really want a solution to crime and mayhem, we need to act as though we understood it — we need to accept what we know intuitively: the problem is poverty. At one point, for better or worse, we had a policy to deal with the problem. It was called the War on Poverty, and no matter how you remember Lyndon Johnson, he was the last American president who even admitted that the condition existed. Ever since Johnson, we've engaged in a nationwide effort to ignore poverty, to push it away, to give it an ever-lower priority. We are reaping the whirlwind, and blaming the homicide rate on the availability of guns is just about as honest and intelligent as suggesting that abstinence and family values are the answer to AIDS. The "solution" to crime in the streets is to make crime less an essential to survival, to lessen the hopelessness on those streets, and to start what will be one hell of a long road back to some form of equity. If you're not willing to do that, then you're going to have to live and die with crime, and more and more of it.

You agree? You'll never vote for the wrong person again? But you still think guns are dangerous toys? You're not convinced that "guns don't kill people, bad social policy does"? You'd still like to hear me talk about the problems of irresponsible if not downright criminal firearms use? Okay:

Proposals have been made over the years for a modified kind of licensing law. These proposals all start off with the idea that guns aren't toys, any more than cars or law degrees are. To own and operate something that dangerous, you ought to have to demonstrate that you know which end the bullets come out of and how to keep little Susie from playing "Fatal Attraction" with her baby sitter. This seems like a reasonable proposition — after all, we make people prove that they've had a specified number of hours of instruction before we let them drive buses or sit on the Supreme Court. So why not a positive license check for firearms ownership; not "prove you're not a nut" but "prove you're an educated shooter."

One objection to this idea comes from the gun-rights side. They point out — and very unfortunately, they can point to concrete examples — that the licensing agencies can and will warp the regulations to avoid issuing any licenses at all. When my state went to a supremely trivialized version of this process, a number of local police agencies simply sat on all hand-gun applications until they were sued out of it. And



James Donnelly

**I'm not a psychopath, but the guy who breaks into my house and steals my gun may well be. Under those circumstances, the law designed to keep guns out of his hands hasn't done dick.**

of course, there's the evil-gun-owner-database objection that I mentioned earlier. But I believe there are ways around these obstacles, especially if the underlying law can be framed with the idea of restraining the government, not simply the citizen.

For example, you (a state) could create a licensing law. Instead of increasing the work load and/or budget of your police departments, you could contract with nonprofits like the NRA or conservation clubs to design and administer training programs and tests. These people would have a built-in incentive to do a good job, since every untoward incident is bad PR for gun rights. Yes, you could maintain a database of gun ownership, but your law could stipulate exactly what the allowed uses of that database were and provide penalties for anybody who tried to use it for other purposes. You could even write in a sunset provision that would require the database to be destroyed if the legal provisions protecting it were repealed. And just as there are regulations forbidding discrimination and requiring performance in other areas of government activity, you could mandate the process and performance of the licensing agency, again with penalties for deliberate foot-dragging or unjust refusal to license particular groups or individuals. To put it in fewer words,

you could create a law whose purpose was to protect the right of the individual at the same time it protected the public — the public being, after all, just the mass of individuals.

If you did that, and if the programs were of sufficient quality, you'd have taken steps to control the behavior of gun owners — not to control guns; laws can't do that — but you'd still face the problem of controlling people other than the licensed owners. How could you deal with preparing people, especially young people, to deal with a social problem in which they may have intense emotional interest but about which they have little knowledge? Does an analogy come to mind? How about sex?

Young people are bathed in sexually charged messages without much information or detachment. They are at great risk of encountering sex and its hazards more or less unprepared, and the results can be deadly. We're trying (in the face of steady, determined, and incredibly irresponsible opposition) to provide some level of protection for them through sex education. So why not gun education? If it's a given that urban young people are going to encounter firearms and even be attracted to them, why not provide some level of training? This used to happen,

either in some formal way or simply within the family, but now, what ideas people get are provided by media images. And we know, of course, how reliable television is in providing reasoned, factual information.

If we can recognize sexually transmitted disease as a thing that kills, and if we can stand up to the imbeciles who want to push the whole topic back into the closet, then why can't we do the same thing for a statistically more effective killer, just as hard if not harder to wish away? I have to say it again: if you don't buy abstinence as a solution to AIDS, I don't see how you can buy gun bans as a solution to poor-on-poor killings. Disarming the poor won't prevent riots, won't cut down on crime, won't accomplish anything except things we keep saying we don't want: more government, more jails and more people in them, more money spent for nothing. If you want less mayhem, it'll cost. But if you attack mayhem by attacking poverty, it won't be money thrown away. It'll be money spent to buy lives back. And it'll be at a cost in dollars — plain old dirty dollars, not pieces of our freedom.

Anything that diminishes one right diminishes all of them and for all of us. No right is an island. ☪

## Women & Guns

No, it's not the official Sarah Connor fan-club zine, but a straightforward firearms publication edited by and for women.

While **W&G** resembles other gun magazines on the surface, there are few articles arguing the "killing power" of pistols the size of small dogs. Topics addressed are basic firearms lore, learning how to choose a weapon, grips and stances, legal questions, and safety. The refreshingly un-macho approach to gun information makes this a useful zine not just for women, but for men who are interested in firearms but tired of articles like "How I Fashioned A Flintlock From A Coke Can, Some Twigs, Chewing Tobacco And Some Old Playboys In Time To Blow Away The Last Living Rhino In The Wild."

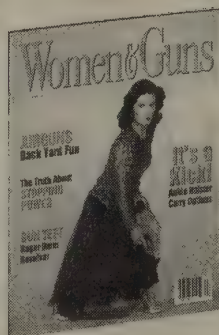
—Richard Kadrey

• The Firestar comes in blued and a special nickel-plated finish called "StarVel," that indicates an electro-less nickel plating applied chemically over carbon steel. To my eye, it's not as attractive as a nice "white" stainless gun, but it's still an attractive piece. More important, I couldn't find any rough or protruding parts that would hang up on my clothes while drawing from concealment. The sights are crisp and easy to use, but sit flush enough to the slide so they won't catch on garments.

• I've even heard that some women wear an ankle holster with evening wear! This won't work if the long, formal skirt has a slit in the back — you wouldn't be able to walk without having it show — and of course, the gown must be quite long, as well as full enough so that the holster won't print through the fabric while you're dancing or watching the opera. When you stop to think about it, formal evening wear for women doesn't offer many opportunities

for concealed carry, and in such circumstances a .38 in an ankle holster is preferable to a .22 in a tiny evening bag. . . .

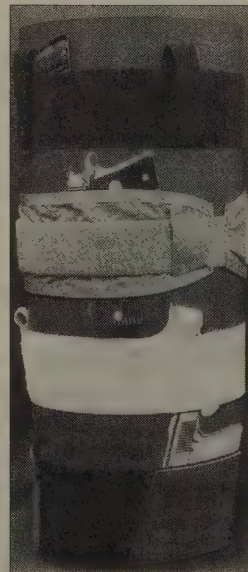
Color is important, because although the holster should be completely concealed when you stand, sit, or walk, sometimes flashes may show at the bottom hem of your pants, or between hem and sock if your pant leg is pulled up a bit.



### Women & Guns

Sonny Jones, Editor.

**\$24/year** (12 issues) from Second Amendment Foundation, P. O. Box 488, Station C, Buffalo, NY 14209; 716/885-6408



Positioning possibilities on midriff holsters. From top, Feminine Protection, Bianchi, Bang Bang Boutique, Guardian Leather.

## The Age of Missing Information

Bill McKibben's book is about two very different days. One is a "real" day that he spent in the mountains near his home in the summer of 1990, and the other is a "TV day": with the help of friends, he videotaped nearly every minute that was broadcast on the cable TV system of Fairfax, Virginia on May 3, 1990. And then he watched it all.

His main theme is perception: how we have perceived the world and our place in it, over generations and centuries, and how television — an element in our world for little more than forty years — alters and filters perception.

McKibben is not out to convince anyone to kill their television. He is trying to get his reader to slow down, to take time to observe events happening in real time, and to practice thinking carefully and deliberately about choices and consequences. —Robin Gail Ramsey

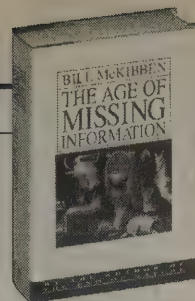
You can watch TV shows that are thirty years old without any real culture shock. Big changes have taken place — the semi-emancipation of minorities and women, the fall of the Communist empire, and so forth. But in material terms life on a 1960s sitcom closely mirrors life on a 1990s sitcom. If you walked into Samantha's kitchen in *Bewitched*, you would know how to make breakfast. In fact, you'd use many of the same products — it's almost eerie, for instance, that the same sugary breakfast cereals that rotted my teeth still rot the teeth of American youth. The bird is still cuckoo for Cocoa Puffs, the rabbit still finds to his immense sadness that Trix are for kids. (The one new breakfast development of my lifetime — Tang, the slurry orange juice of astronauts — seems to have all but disappeared.) If you walked into Tabitha's playroom, you'd recognize most of the toys — Barbie, for sure. (The ideal of feminine beauty has not appreciably shifted — Barbie's measurements remain standard.) She would probably have a Nintendo, which is new. But a modern kid who turned on her TV (after searching fruitlessly for the remote control) would recognize the Mickey Mouse Club from its new incarnation, although the Mouseketeers now have good nineties names: Chase, Deedee, Lindsey, Marc, Jennifer, Josh, Brandy, Alana, Jason, Tiffany, Damon. . . .

If you did a similar experiment in, say, 1950, returning to the average American home of 1920, the changes would be staggering. It's that time of rapid progress we're really thinking about when we tell ourselves stories about the dynamic twentieth century. By contrast, the memories of

people my age are spookily familiar. A hostess on one of the shopping channels was urging viewers to buy TV trays — "I have very vivid memories of when my grandmother got her first TV trays," she said, her eyes misting. Or, as country music crooner Mac McAnally sang in a deeply nostalgic song about his Mississippi hometown, "TVs, they were black-and-white, back where I come from."

To continue believing that this is all so shiny and exciting, we have to pretend that we're people we're not.

TV clearly understands that at least the idea of community ties attracts us. What is *Cheers* but an enclosed neighborhood where people depend on one another when the chips are down? "Where everybody knows your name. And they're always glad you came." No one moves away, no one can



### The Age of Missing Information

Bill McKibben, 1992; 261 pp.

**\$20** (\$22 postpaid) from Random House/Order Dept., 400 Hahn Road, Westminster, MD 21157; 800/733-3000 (or Whole Earth Access)

break up the kind of love that constantly makes jokes to keep from acknowledging that it is a kind of love. "You want to go where everybody knows your name." That's right — we do. That's why we loved *M\*A\*S\*H*, another great TV community. But on TV, of course, while you know everybody's name, they've never heard of yours.

## Harriet the Spy

*Harriet, an eleven-year-old Manhattanite, spies in preparation for a career as a famous writer. She records in a notebook her observations about the regulars on her spy route and her family and friends — the last of whom include Sport, who dreams of becoming a CPA, and Janie, who plans a future as a chemist and terrorizes her mother with her experiments.*

*When Harriet isn't spying, she's reading or plotting with Sport and Janie against their classmates. That is, until Harriet's friends find her notebook and are so angered by its brutal honesty they cut her off and form a spy-catching club.*

*Readers watch as Harriet struggles with the deep depression that follows and as she grows and changes. The sensitivity with which this child's story is told made it a milestone in children's literature. It is a story that is both heartbreaking and hilarious, with, at its center, a young girl you will not easily forget. —Lisa Winer*

WHEN I GROW UP I'M GOING TO FIND OUT EVERYTHING ABOUT EVERYBODY AND PUT IT ALL IN A BOOK. THE BOOK IS GOING TO BE CALLED *SECRETS* BY HARRIET M. WELSCH. I WILL ALSO HAVE PHOTOGRAPHS IN IT AND MAYBE SOME MEDICAL CHARTS IF I CAN GET THEM.

Harriet consulted her mental notes on Pinky. He lived on Eighty-eighth Street. He had a very beautiful mother, a father who worked on a magazine, and a baby sister three years old. Harriet wrote:

MY MOTHER IS ALWAYS SAYING PINKY WHITEHEAD'S WHOLE PROBLEM IS HIS MOTHER. I BETTER

ASK HER WHAT THAT MEANS OR I'LL NEVER FIND OUT. DOES HIS MOTHER HATE HIM? IF I HAD HIM I'D HATE HIM.

Janie passed the notebook to Sport and Rachel, never taking her eyes off Harriet as she did so. "Sport, you're on page thirty-four; Rachel, you're on fifteen," she said quietly.

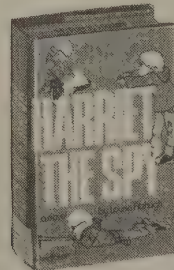
Sport read his and burst into tears. "Read it aloud, Sport," said Janie harshly.

"I can't." Sport hid his face.

The book was passed back to Janie. Janie read the passage in a solemn voice.

SOMETIMES I CAN'T STAND SPORT. WITH HIS WORRYING ALL THE TIME AND FUSSING OVER HIS FATHER, SOMETIMES HE'S LIKE A LITTLE OLD WOMAN.

Sport turned his back on Harriet, but even from his back Harriet could see that he was crying.



### Harriet the Spy

Louise Fitzhugh, 1964, 1990; 304 pp.

**\$3.95** (\$6.70 postpaid) from HarperCollins Publishers/Direct Mail, P. O. Box 588, Dunmore, PA 18512; 800/331-3761 (or Whole Earth Access)



# "I Wander The Terrain, Playing Godzilla"

BY FREDDY BOSCO

*Freddy Bosco had a weird poem in the last issue of our former incarnation, CoEvolution Quarterly (Fall '84), composed entirely of book titles gleaned from a library card catalog. His adventures since then have included a journey through some dark times, for which part of the self-help was putting his own words down on paper. He lives in Denver.*  
—Richard Nilsen

**I** HAVE FALLEN ON GOOD TIMES.

Those who don't have money must be clever and think seriously about how they will manage. I don't know many people, even those who have a lot more money than I do, who do not fall in this category. As one friend said (an accountant), "People who have big incomes have big bills." And a pair of twins — heirs to a fortune — once told me, "There's no such thing as enough money." I think I am likely to be favorably aspected with the ability to find money with relative ease. And it is the objectification of value.

Is there anything immoral about religious instruction between consenting adults?

No: I don't want my life to come to an end. Not just yet, anyway. (I'm enjoying myself. Not *too* much, *just* right!)

The Game gets tiresome, and people object to you. It's when you start to object to yourself that it gets serious.

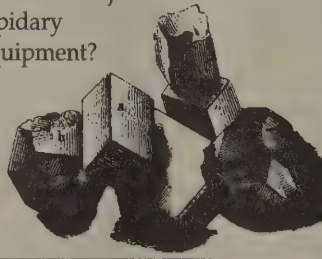
A simple appeal to the purest part of others does not guarantee that they will respond in kind.

I agree with the one who said, "It is all designed to drive you inside."

Grateful as much for sleep as for life itself.

I don't understand. But do I need to?

Is this life or just lapidary equipment?



Staying in a mental hospital is easy: you can find nothing to do when you're looking for it, and they're always after you, when you want to sit still, to do something you don't want to do.

It's strange how life got to this point: several people besides myself are eagerly looking forward to dying.

I might actually be safer than I think.

If Nixon would have friends and admirers, then surely I can, too.

I frequently imagine the worst and then go about creating it.

I am an interesting character. Along with the old Chinese malediction ("May you be born in interesting times"), may I add, "May you be born an interesting character."

Does the phoenix each time, rebuild larger or smaller?

If you can, be smart. But if you can't be smart, be good.

After we have exhausted everyone's credit and patience with a Christmas-based economy, the day will burn dimly as any other religious holiday.

A mystic is someone who is equally uncomfortable everywhere.

Is it all good for something? It's all good for what it is.

I turned on my radio. A man sang, "Make the world go away." So I turned off my radio and waited for further instructions.

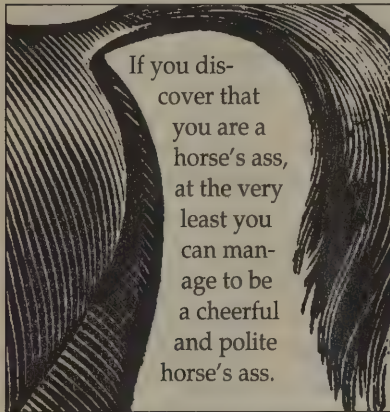
So she said she would call me when she had time to go out. By the time she calls, I hope to have found someone who can make me forget her.

Do the things you do well but do not regret learning the things you do not do well. Just don't get any ideas of being Renaissance.

The point, as I have learned it, is not to carpet the kingdom; carpet your feet.

Taking such a morbid attitude is the way I appreciate each day as it comes.

To be alive is to be in trouble.



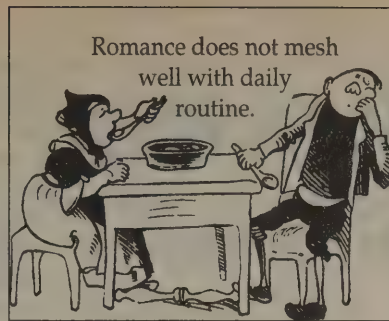
What do you call a dude put in a mental hospital? —Sub-dude

The greatest agony is anticipating pain.

Granting freedom is not the same as being indifferent to another's condition.

Before you crush that cockroach: could I make one? A cockroach that actually worked like a real one?

Thank you, O Lord for this day in which I have unlocked some heavenly thoughts of love. This, we know, is what makes the world go round. It also makes the minutes stand still in reverent glee. As I rejoice in the glow of love we all become happy and everything is fine. Just that unveiling



of our hearts to make us see that we are still babies, serious babies undone by falls, devastated by rejection and delay but roaring with delight when life is beautiful for no reason at all.

You didn't return my call; that's not the answer I was looking for.

Who remembers any of the people who harassed Johnny Appleseed?

Poverty is a great way to slow down.

Addiction is merely the desire to live a short painful life.

Is impoverishment a form of simplicity or is it the only form? But poverty can be complex, if we refuse to learn its lessons.

Perhaps my greatest innovation in human affairs is my method of cutting your toenails without taking off your socks. Don't ask me how; it's a patented secret. I will reveal that it destroys socks.

If it's all the same to you, I'd just as soon isolate.

Sometimes I know to drop everything and practice when that thirst hits.

The story of a relationship: From "You don't have to go home tonight" to "You don't have to come home tonight."

The story of mental illness: we are not always on-line.

I have never seen a Chinese typewriter, but people laugh at me anyway. I don't mind, but I could show them a happier laughter.

Either that's Venus or it's a 747.

Here in 1992 one is dictated a program for survival: light food (lots of salads with light dressing); white wine or mineral water; safe sex or none at all. Whoopee.

It will leave when I am through with it; no need to kill myself to kill the pain.

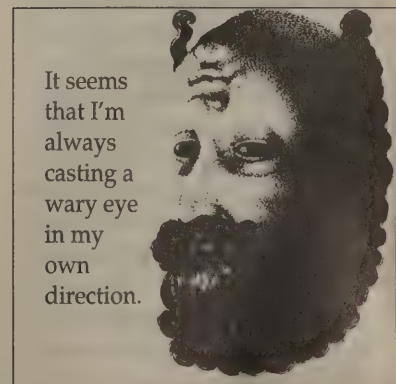
It's possible that we pay for our mistakes at the moment we make them, or is there a final reckoning in which we are presented a bill?

People wonder about me. Why does he look so old? Why is he broke? Why isn't he married? Why is he alone?

So what am I to do? Explain myself?

Hip means you are & of everything going on around you, and all the implications. Cool means you do nothing about it.

We are sure of the map we have drawn of the other side of existence. We are sure, even further, that a party waits for us right after we swallow the contents of these bottles. "How sad," they will all say. "We could have been better friends." But. The pain drives us on and what is it that prevents the drive to suicide? Maybe that cup of coffee hits us just right. We love for the smartest hook to pull us, refreshed for our careening towards back into a life. We recognize again, for the gift it is. ☺



# Why Public Radio Isn't

## (And What You Can Do About It)

BY RACHEL ANNE GOODMAN



HEN WAS THE LAST TIME you felt like you were the "public" in public radio? Seldom, you say? Now there's a new trend that may remove you for good. Once seen as immune to market speculation and rapid swings in format, public radio has gone commercial in its thinking. The programming will soon follow, and the biggest losers in this battle for dollars will be us, the listening audience.

This article is an attempt to analyze the latest trends in public radio programming, and to reveal the conversations that are taking place behind closed doors. What is at stake is more than just hearing your favorite classical piece with the minor movements cleanly excised for "happier listening." We stand to lose our voice in the one medium that claims to be by and for the public.

There are approximately 1,500 noncommercial stations in the US. Some use the label "public," some "community," and some "educational." For the sake of this discussion, "public" will mean the 340 stations funded by the Corporation for Public Broadcasting (CPB) and interconnected to a central programming source by satellite. "Community" generally refers to stations as to a community group or college, with a strong local identity, that upholds public access as a guiding principal. While there are many different formats on the noncommercial dial, trends are afoot that affect everyone equally.

It doesn't take a Sherlock Holmes to find signs of public radio's current direction. Just take a look at the audience descriptions in this year's *Broadcasting Yearbook*. For every one that says "ethnic/cultural" or "diverse," there are three that read, "target audience: 'upwardly mobile, educated youth,' 'upscale, affluent, socially conscious,' '25-50 urban professionals,' 'educated adults.'"

Most stations make no apologies about the high income level of their target audience. They assume they will attract the wealthiest listeners by offering an inoffensive menu of classical music and news. A recent CPB-funded survey of 750 public stations found that classical-music formats dominated the field, occupying 34 percent of on-air hours. Jazz and news came in second and third. The survey found that public radio had less appeal for African Americans, Asians, and non-highschool-educated folks. Station programming plans through 1995 show no indication of a change in that demographic.

We did a reader survey a while back, trying to learn more about our subscribers' media habits. It was small and not statistically significant, but what was amazing was that 100 percent of the respondents said they listened regularly to National Public Radio. Especially when driving a car, public radio is a part of the media mix many of us take for granted. That may be a mistake.

Rachel Anne Goodman is a writer and independent radio producer. She lives in the Shenandoah Valley of Virginia with her two-year-old Adam and husband Don Mussell, who is also a community radio advocate and engineer. —Richard Nilsen

### One Station/One Format

There is a new move toward single-format public radio stations. WHYY in Philadelphia used to have news, classical, folk, blues, jazz, and local public-affairs programming. One day the program director called in the on-air volunteers and told them their services would no longer be needed. The station went to an all-news format, relying heavily on satellite feeds from NPR and augmenting it with local news and talk. The trend caught on at KPBS in San Diego, which went all news/talk in winter 1990. "The whole point was to serve the community," insists Michael Flaster, program manager and architect of the switch. "We didn't want to isolate the communities and say, 'this is *your* half-hour, and this is *your* half-hour.'" These stations are reporting a big increase in dollars and a surge in their ratings. Most of the dozen or so all-news stations are in major cities, where there are lots of other radio choices. But what happens when a small town's

only non-commercial station follows this path?

### **Space Invaders: Satellite Takes Over**

Once a station gets a satellite dish, hundreds of high-quality programs become available at the flip of a switch. Currently the average programming ratio is 60 percent local, 40 percent national, but the hours for satellite-fed shows are increasing, along with their placement in prime-time slots. Program directors argue that highly produced programs like "Morning Edition" and "Talk of the Nation" draw more listeners and dollars. They also cost so much that some stations are cutting other programs to pay for them. Does that mean all our local public stations will become mere repeaters for National Public Radio in Washington? In the end, the expense of these programs may ensure that the local programming will remain. But what exactly does local programming sound like?

### **Uneasy Listening**

Consultants from a Cleveland, Ohio affiliate are hard-selling public radio stations a new, \$8,000 computer software package. The program spits out playlists each day based on key words that are designed to inspire people to tune in. For the morning it chooses "uplifting, inspirational" classical pieces. The computer prints out popular selections which are composed in major keys, or if not, suggests omitting the movements in minor keys. "Familiarity creates tune-in" is a favorite catchphrase of program directors. That means you will hear warhorses trotted out in formation. The tried-and-true melodies of Tchaikovsky's First Piano Concerto. How about the theme from *Swan Lake*? Or that second movement from Beethoven's Ninth Symphony? Does this

**The common vision of community stations stems from understanding the uniqueness of the listeners they serve. Local citizens actually have some say in what comes out of their radio.**

sound like the Classical Top Forty? WMRA-FM, in Harrisonburg, Virginia, recently spent \$18,000 of listener contributions (unbeknownst to the contributors) for classical marketing research to go with their new computer-run programming system.

### **The Economy Made Us Do It**

Most public radio stations will defend their narrow programming in terms of the current economy. True, budget crunches on the state level are affecting the university funding that is the lifeblood of these public stations. While the economic arguments are real, they are also self-created. Stations have become increasingly autocratic in their staffing, and have enlarged their staffs to accommodate the increased paperwork. They have replaced volunteers with paid announcers, citing the need for "oversight" of air sound. The most popular programs tend to come from NPR or APR (American Public Radio), and are the most expensive. A typical station can pay as much as \$50,000 for "All Things Considered" and "Morning Edition." Although listener contributions are at an all-time high at most stations, the increasing cost of satellite programming keeps them

struggling to balance their budgets. A cycle is set in motion in which program directors measure a show by its profitability alone, forgetting that there may be other yardsticks by which to measure success.

### **The Consultants Made Us Do It**

Did all these program directors spontaneously decide to eliminate the "community element" from their stations? Hardly. A critical document came out of NPR in 1986 — the *Audience-Building Task Force Report*. With the goal of doubling public radio's audience by the year 1990, it advised "professionalizing" the sound by eliminating programs where "each person selects program material on the basis of personal taste." Commercial audience research from Hagen Media Research in Washington is also being circulated around NPR stations. It reveals that "talent" (read: local-human-being announcer) just isn't important to listeners. The issue hinges on program directors having control over every aspect of programming, including what announcers will play and say. This control is centralized through the Public Radio Program Directors Association, a group headed by consultant Craig Oliver, who has pushed his single-format theory aggressively within the public radio system.

What is at stake when announcers are removed from artistic decisions? Up until recently, most hosts were chosen on the basis of their speaking skills and their musical knowledge. They had a personal passion about their music that we shared with them as listeners. I've even been persuaded to listen to Swiss yodeling because the DJ introduced it so well. A DJ used to be a person you could call up and talk to. Now the internal memos advise DJs to ignore requests if they don't fit into the format.

## Keeping Regional Identity

In some parts of the country, you can tell where you are just by tuning across the dial. You can still hear a Norwegian lilt in the Midwest, or a drawl in the Southeast. In the rural South you might find obituaries read at 10 A.M. and the swap-shop call-in program at noon. One California station has a community bulletin board where you can find a vegetarian, lesbian roommate or a pet chihuahua; turn the dial, and the local city council is duking it out over building a new mall. There's a women's show discussing self-defense, and there's a Chicano show talking about immigration. At WMMT in eastern Kentucky, you'll hear about the coal strikes, land-use battles and music that characterize life in the region. The common vision of these community stations stems from understanding the uniqueness of the listeners they serve. Local citizens actually have some say in what comes out of their radio.

If you live in rural Maine, what's wrong with having some guy from St. Paul, Minnesota giving you the day's news and music? The answers cut to the heart of what's bothering many folks today. We may be a highly mobile society, but we still want to know where we live, and to feel connected to our neighbors. When there are no local people doing shows of local or regional interest, the community is not represented to itself over the airwaves. During the L.A. riots, some citizens who turned to public radio for information heard news feeds from CNN being reported from Atlanta.

One public station I worked for told me I couldn't read a lost-dog announcement that was called in because it made us sound too "provincial." Soon after, they dropped the bluegrass program-

ming because the rural audience it attracted "wasn't educated and upscale enough" and didn't "fit our mission statement." This station serves a largely rural audience. Public-radio program directors have misread their core audience in much the same way presidential candidates have alienated voters. As with election speeches, during fundraisers they claim to give listeners a voice in programming decisions which does not actually exist. As in our two-party system, listeners must choose from a tiny menu of programs when they vote with their pledge dollars. More "audience research" is being done these days to determine the needs of listeners. However, the Arbitron rating service used by many stations measures the average number of people who listen to existing programs, not audience needs.

## Over the Rainbow

The face of America is changing; unless public radio changes with it, it will continue to suffer from an elitist image and, eventually, diminishing resources. On a national level, there are encouraging signs. Peter Pennekamp, NPR's v.p. for cultural programming, says his department has just received a \$400,000 grant from the Ford Foundation to explore and develop programming for multicultural audiences. Lynn Chadwick, president of the National Federation of Community Broadcasters, is pushing the Corporation for Public Broadcasting to increase its service grants from \$2 million to \$5 million. While opposing the plan to bring networks into rural areas, she is lobbying for support of local programming. Responding to ethnic and regional needs, networks like "Radio Bilingual" in California, "The Native American Broadcasting Consortium," and "The Southern Regional Network" are filling the

gap. Still, when it comes to local control, in 1992 there are only 39 noncommercial stations owned by African Americans, and 13 owned by Hispanic groups.

## Listeners Want to Be Heard

A quiet battle is being waged by several citizens' groups across the country to gain some voice in their public stations' programming. At the heart of the fight is not which format will prevail, but who decides and who is responsible. One morning last year, the people of Grand Junction, Colorado woke up to find that their local public radio station, KPRN, had been taken over by its urban cousin, KCFR from Denver, which beamed its signal into town via satellite. KPRN's board of directors, acting independently of the community advisory board, simply gave the station's license away to a new entity created to oversee both stations. The community advisory board and other disgruntled citizens are now involved in litigation that they hope will return local control of the station.

At KUNM in Albuquerque, New Mexico, citizens are fighting a similar battle. Management replaced community volunteers with an all-jazz format right after soliciting money based on the original eclectic programming. The ex-volunteers filed three lawsuits, charging the station management with fraudulent trade practices, a breach in First Amendment laws, and limiting public access. The University of New Mexico, which owns the license, has already spent a quarter of a million dollars on legal costs. Five years later, the citizens' group has settled for representation on an advisory board with decisionmaking power over station policy. The station management is presently attempting to reverse this agreement. Claude

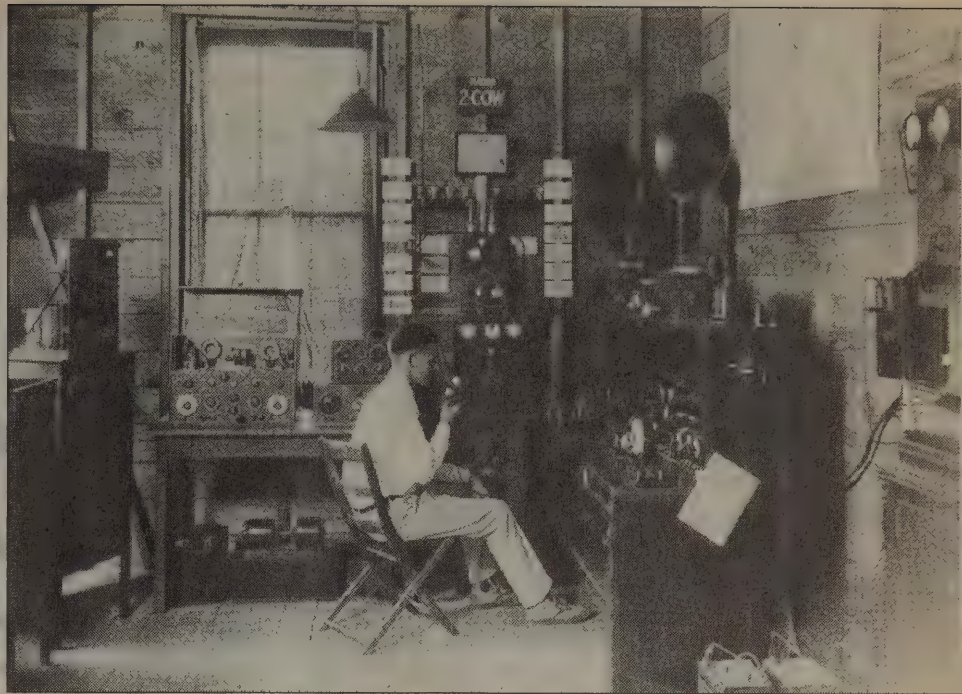


Stephenson, one of the group organizers, observes, "The management at public stations is not accountable to the public. We are trying to create a situation where there are checks and balances on their authority over programming." His wife, Zoe Econimu, is vice-chair of the embattled community advisory board. She suggests that if attempts at diplomacy fail, listeners should organize a campaign of withholding pledge dollars, boycotting underwriters, and attending advisory-board meetings.

### Public Radio for the Public

Radio cannot be for the public unless it is also *by* the public. If you live in an area where the public station still seems responsive to local needs, fight like hell to keep it that way. Get involved as a volunteer, if they still allow such things. Get together a community watchdog group and have regular listening sessions where the service is evaluated for its responsiveness to its audience. Get on the community advisory board. Become a regular commentator, airing your (articulate) views on important local topics. And support the station with your dollars when it does good. Write letters; be a responsible pest. If all else fails, find an open frequency and start your own noncommercial station. At this writing I know of a half-dozen new community stations preparing to go on the air with a local service.

To quote community radio pioneer Lorenzo Milam, "A radio station should not just be a hole in the Universe for making money, or feeding an ego, or running the world. A radio station should be a live place for live people to sing and dance and talk: to talk their talk and walk their walk and know that they (and the rest of us) are not irrevocably dead." 🐾



Radio 2-COW, New Platz, New York.

The Radio Papers

# Radio Days & Nights

BY LYNN KEAR

I have become increasingly discontented with mainstream television and cinema. In many cases, the acting is poor, the plot is threadbare and silly, and the emphasis is on sex and violence at the expense of storytelling. While researching and writing my book, *Agnes Moorehead: A Bio-Bibliography* (Greenwood Press), I discovered the intriguing world of radio programming prior to the advent of television.

Upon listening to tapes of old radio shows, you will find that their content is very different from that of contemporary radio stations. Forget adolescent disc jockeys, boorish talk-show hosts, and bland music. Instead, imagine variety shows, theatre, sports, symphony and opera, dramas, and comedies with some of the finest actors, writers, and musicians performing some of their best work.

For those of us born in the 1950s or later, it is difficult to understand the popularity of the radio to Americans. But from the 1920s

through the 1940s, before the pervasiveness of television viewing changed radio programming, radio broadcasts were an integral part of many Americans' cultural experience. We have all seen photographs of listeners huddled around the family radio, their ears cocked toward the small speaker. And we have all heard about Mercury Theatre Of The Air's adaptation of H. G. Wells' "War Of The Worlds," in which a precocious Orson Welles managed to fool much of America into believing the country was being invaded by Martians. However,

Sound-effects men creating a collision, 1930.



The Radio Papers

many of us have not actually heard any of these old radio programs. Listening to them is nothing like listening to a book on tape. Voices, music, and sound effects all combine in a synergistic force.

Celebrated writers who wrote for radio include George S. Kaufman, William Saroyan, Lucille Fletcher, Norman Corwin, and Irwin Shaw. Some of the entertainers who performed widely in radio included Jack Benny, Helen Hayes, Ozzie and Harriet Nelson, William Conrad, Ida Lupino, Orson Welles, and Agnes Moorehead. In fact, Moorehead, who is unfortunately best known as the arrogant witch/mother-in-law on television's "Bewitched," did some of her most compelling work in radio, appearing in literally hundreds of radio programs; in particular, seek out the one-woman thriller, "Sorry, Wrong Number," an episode from the popular series "Suspense," or one of the episodes of "The Shadow," in which Moorehead appeared as Margo Lane, with Orson Welles as the title character.

Fortunately, some people have diligently collected radio broadcasts and documented the programs that were broadcast during that time period. Unlike cinema and television, radio research still has a long way to go in terms of providing researchers accurate and complete documentation; one has to do a lot of digging through many different sources in order to find all references to a particular program or performer. So anyone who is interested could make it his/her life's work to provide an indexed reference for radio shows.

Below are some of the better books that provide the flavor of the old radio programs and the stars of the era.

*Don't Touch That Dial: Radio Programming In American Life.* J. Fred MacDonald. Chicago: Nelson-Hall, 1986.

*The Pictorial History of Radio.* Irving Settel. New York: Grosset & Dunlap, 1967.

*Tune In Yesterday: Radio 1925-1976.* John Dunning. Englewood Cliffs, NJ: Prentice-Hall, 1976.

Several organizations have formed for the purpose of bringing together radio aficionados. These organizations often publish newsletters and provide a means to share tapes and information. When you write to them to find out the cost of dues and what services they provide, be sure to enclose an SASE.

Golden Radio Buffs  
c/o Owen Pomeroy, 3613 Chestnut Drive, Baltimore, MD 21211

ORCA (Old Time Radio Show Collectors Association)  
45 Barry Street, Sudbury, Ontario, Canada P3B 3H6

Radio Collectors of America  
c/o Bob Levin, 8 Ardsley Circle, Brockton, MA 02402

SPERDVAC (Society to Preserve & Encourage Radio Drama, Variety, And Comedy)  
Box 1587, Hollywood, CA 90078

NARA  
(North American Radio Archives)  
P. O. Box 118781, Cincinnati, OH 45211

Many dealers will sell you radio programs on cassette or reel-to-reel tapes. Many also sell specialized books and logs describing each episode in the history of a particular program, such as "Suspense," "Fibber McGee And Molly," or "Jack Armstrong." Again, include an SASE with your request for information.

Radio Yesteryear  
Box C, Sandy Hook, CT 06482

Jay Hickerson  
Box 4321, Hamden, CT 06514

Priceless Sound  
P. O. Box 1661, Salinas, CA 93902-1661; 408/372-7966

Redmond Nostalgia Company  
P. O. Box 82, Redmond, WA 98052-0082 ☺

## Free Speech in an Open Society

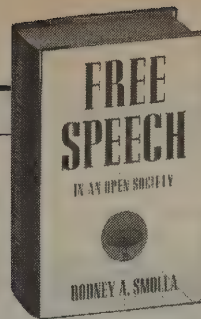
What if people were free to speak up? Governments of all sizes have faced that question. The answer from the United States, over the past two centuries, differs from the answers that came before it. Will something like the US First Amendment become a recognized right of other people, as the world continues to change? Rodney Smolla's perspective offers many cautions and much hope.  
—Hank Roberts

As democracies around the world look to the American experience under the First Amendment for what they can learn in working through their own conceptions of

freedom of speech, they are likely to be startled by much of what they find. The world may not be ready for the American First Amendment. Other democracies may be shocked by how uncompromising most modern American free speech principles truly are.

We need to think carefully about these differences, because the new technologies that increasingly knit the globe into one giant electronic village will tend to create an international marketplace for free speech, which will in turn create enormous pressures toward uniformity in free speech policies.

There will be pressure from one direction on the rest of the world to adopt notions of free speech more like America's. There



### Free Speech in an Open Society

Rodney Smolla, 1992 (Knopf); 429 pp.

**\$27.50** (\$29.50 postpaid) from Random House/Order Dept., 400 Hahn Road, Westminster, MD 21157; 800/733-3000 (or Whole Earth Access)

will be a corresponding pressure from the opposite direction for America to water down its free speech principles to conform more closely to the rest of the world's.

## Where the Buffalo Roam

Geographic information — maps tied to databases — is reaching town meetings all over the arid Great Plains. Deborah and Carl Popper, the subjects of this book, have mapped the changes over time, and are out there showing people that the frontier is still with us. How do you show people what the future may hold? Do it with pictures that make the database numbers come alive.  
—Hank Roberts

County by county, Deborah has built statistical portraits of land-use distress for the Plains states. One indicator is population loss from 1930 to 1988. Whereas many counties in the Dakotas have lost half or more of their population in that period, parts of western Nebraska seem to be holding their own, especially in the towns on or near the Platte River and Interstate 80, though Deborah's programs immediately flag danger zones like Hayes County (pop. 1,356).

Population loss of 10 percent or more between 1980 and 1988 is another warning sign of land-use distress. So are low-density counties, with four or fewer people per square mile (the U.S. average being 68.1), and counties with a median age of thirty-five or higher (the U.S. median is thirty

years). A poverty rate of 20 percent or more among a county's residents (U.S. rate: 13.5 percent) is yet another key, as is new-construction investment of \$50 or less per capita (U.S. average: \$850). As an additional index of economic health, Deborah incorporates each county's Dun and Bradstreet ratings.

"Remember, the Commons interests lots of groups, most of whom dislike each other," she tells Hurst. "The buffalo rancher hates the cattle rancher, who hates the oilman, whose blood boils at subsidized farmers, who scorn the Bay Area environmentalist, who loves the romance of buffalo but would never order a buffalo steak except in a very trendy restaurant."

Hurst is startled by her sangfroid. "You're deliberately encouraging vying value systems, then, despite the hatreds already there?"

"The West is a big place," Deborah replies. "We're all having to deal with a national deconstruction of our excesses. Wilderness areas in national parks are already graded by sanitation and supplies. The Commons is really one giant conservation easement. But not a uniform one."

The questions rumble on. Most are perorations, stylized and boosteristic, constructed to earn points with peers around the room.

We have the best damn wheat economy in the United States; are you going to ignore Oklahoma's feed grain output? . . .

Say it straight: Your Buffalo Commons means more government interference. Get food prices up, and more farmers would stay on the land.

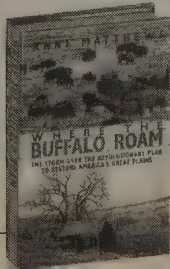
You New Jersey urban people can't understand; we always have hard times. Always. They come and go; bad cycles, hard times, dry months, dry years.

"Try dry decades," barks Frank, finally. "Listen: You cannot go on as you are. Ignoring a shift this fundamental is regional suicide."

## Where the Buffalo Roam

Anne Matthews, 1992; 193 pp.

**\$19.95** (\$21.95 postpaid) from Grove Weidenfeld/Sales Dept., 841 Broadway, New York, NY 10003; 212/614-7850 (or Whole Earth Access)

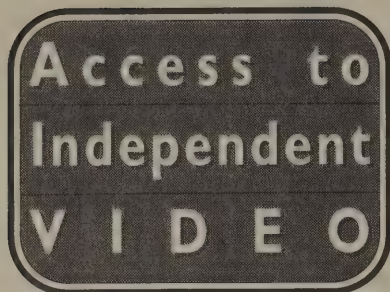


Whether the messages we send and receive travel above ground or below, at the speed of light or the speed of sound, through wire or through space, is less important than the awesome reality that billions of crisscrossing messages will be sent and received, with fantastic frequency and speed.

Historically, technological innovations in communications have worked revolutions in law and policy, often triggering cycles of robust free expression followed by official regulation, or even censorship, followed in turn by protest and eloquent pleas for freedom. Censorship is a human instinct. The Roman censors, who in addition to the mundane administrative matters of state also had charge of superintendence of public morals, found it only natural to persecute the fledgling Christian church, an upstart threatening good Roman morality. Those abused as children often become abusers as adults, and the Roman Catholic Church, in its stodgy middle age, became a vengeful censor. The Church banned "heresy" (a word with an interesting etymology, derived from a Greek word that means, among other things, "choice") by prohibiting "choice" on matters of faith and morals, punishing the heretical choosers with everything from excommunication to execution.

Censorship was logistically simple for the Roman censors and Church until Gutenberg's invention of the printing press in 1450. Handwritten books were laboriously produced by a small number of persons under the strict control of authority; there was no opportunity for the mass distribution of printed material challenging the orthodoxy. It is no accident that shortly after Gutenberg invented the printing press, official authorities invented the first censorship bureau. In 1485, only thirty-five years after Gutenberg made mass dissemination of the written word a technological possibility, the Archbishop of Mainz — the city where Gutenberg lived — created an office of the censor. The precedent took hold.

# CHAINSAW CHEERLEADERS & AUTHORS OF NOTE:



BY RICHARD KADREY

## Trailers

One of the best parts of going to the movies is seeing the trailers for upcoming releases. At their best, trailers are micro-movies in themselves, distilling the 100 minutes of a feature into two or three minutes. Trailers are often better than the movies they advertise.

Trailers on Tape is an outfit that has collected dozens of old trailers (between 60 and 75 minutes' worth per tape) onto sixteen videotapes including musicals and adventure movies, Alfred Hitchcock, science fiction and horror. Two of Trailers on Tape's funniest and sleaziest titles are **Psychotronic: Midnight Movie Madness** (everything from *Texas Chainsaw Massacre* to *Citizen Kane*), and **AIP: Fast and Furious** (American International's exploitation flicks like *Wild in the Streets* and *Beach Blanket Bingo*). Write to them for their complete catalog.

**Martial Arts Mayhem** is a collection of two dozen Chinese, Japanese and American martial arts film trailers, including promos for films by Bruce Lee, Chuck Norris and Jackie Chan. The picture quality is excellent; however, there are a few minor technical problems (picture not always centered in screen, etc.). But they're minor, and frankly, with these movies, imperfections kind of make it more fun. Sort of like going to that broken-down drive-in out by the interstate.



The Screw Machine and a 20-foot Tesla Coil battle to the death in Survival Research Lab's performance *The Pleasures of Uninhibited Excess*.

**Trailers on Tape:** \$38.45 each postpaid; catalog free. 1576 Fell Street/Suite 1, San Francisco, CA 94117; 415/921-8273.

**Martial Arts Mayhem:** \$21.45 postpaid from BOOPzilla Productions, 54 Turner Street #3, Brighton, MA 02135.

## Tribulation 99: Alien Anomalies Under America

For real conspiracy buffs, *JFK* was a mere bauble. For the pure-product conspiracy rant of your lifetime, try **Tribulation 99**. Told in a fast-paced, apocalyptic jump-cut style, **Tribulation 99** uses stentorian oratory and stolen B-movie footage to rip the lid off the conspiracy of evil, extraterrestrial Q-men who manipulate world events from their lair in the center of the Earth. Their goal? To destroy the human race! See the evil Qs assassinate President Kennedy! See their human duplicates cover up weird cattle mutilations! See them bug Democratic Party headquarters in the Watergate Hotel!

Filmmaker Craig Baldwin has blended historical fact with dozens of paranoid rants and crank theories, lifted from books and tracts, into perhaps the ultimate video paranoia-fest. As if that wasn't enough, Baldwin has produced

a handsome book based on the film, full of the same images and narration. Beware! This, too, could be part of the conspiracy!

**Tribulation 99** (Alien Anomalies Under America): \$19.99 postpaid; book \$6.66 postpaid; both for \$25 from Craig Baldwin, 992 Valencia Street, San Francisco, CA 94110.

## Mandelbrot Sets and Julia Sets

Two full hours of supercomputer-generated fractal imagery. Basically, a fractal is a graphic representation of a mathematical formula whose overall shape is repeated on any scale. Some of the dozens of fractal studies on this tape use the supercomputer's drawing power to "zoom" into a small section of the fractal. In a few minutes, you realize that you are looking at exactly the same image you started from. The booklet accompanying the tape will ex-

plain exactly what all those bifurcated lines mean. With two hours of original electronic music.

**Mandelbrot Sets and Julia Sets:** \$38.40 postpaid from Art Matrix, P. O. Box 880, Ithaca, NY 14851-0880; 800/729-3889.

## Towers Open Fire

### • William Burroughs: Commissioner of Sewers

William Burroughs worked with friends like Anthony Balch and Brion Gysin in film experiments during the early sixties. Many of these experiments are gathered together in Mystic Fire Video's **Towers Open Fire**. Burroughs' use of language and imagery, especially in combination, is designed to break down your existing thought processes and let you see the control mechanisms that want to run your life.

**William Burroughs: Commissioner of Sewers** is a fine complement to the other video. It's a series of interviews and readings wherein Burroughs lays out his basic philosophy of life and work.

**Towers Open Fire & William Burroughs: Commissioner of Sewers:** \$33.95 each postpaid from Mystic Fire Video, P. O. Box 9323, South Burlington, VT 05407; 800/292-9001.

## The Pleasures of Uninhibited Excess

Mark Pauline and Survival Research Laboratories have been around for over ten years, staging startling and violent performance events in which their gruesome homemade machines are unleashed on stage sets and each other. The machines are the only play-



*No Such Thing As Gravity*

ers in SRL's shows, walking, crawling, rolling and occasionally flying across the performance area like mechanized Bosch demons. The themes of SRL's shows are almost always political, the staging blackly comic in its over-the-top combination of crashing metal, ear-blistering noise, and flames.

**The Pleasures of Uninhibited Excess** documents three spectacular SRL performances and, as a bonus, includes hysterical TV coverage of the mysterious appearance all over the Bay Area of scary-looking objects marked "Explosives"...

**The Pleasures of Uninhibited Excess:** \$28 postpaid (CA residents add 6.75% sales tax) from Survival Research Laboratories, 1458-C San Bruno Avenue, San Francisco, CA 94110.



Medusa spews flame and subsonic vibrations from a homemade jet engine in Survival Research Lab's performance *The Pleasures of Uninhibited Excess*.

## No Such Thing As Gravity

Low-budget science fiction is usually the bottom of the barrel; cheap effects, bad acting and dumb ideas can leave you feeling like your brain just got a toxic-waste wax job. But like a lot of trash culture, when the right person comes along, the whole idea can be revived. The Hernandez Brothers did it for comics with *Love and Rockets*. And director Alyce Wittenstein might do it for SF-on-the-cheap with **No Such Thing As Gravity**.

The film is both homage to and satire of all those lame SF movies you grew up on. While this might have been enough to be amusing, Wittenstein takes it further, making the cheapness of the out-of-context sets into something weirdly beautiful. She also gets more out of her actors than those fifties potboilers ever did, charging her movie with a nervous energy and sexiness that would have sent Hugh Beaumont and John Agar screaming for the hills.

You don't need to know the plot — if you grew up watching black-&-white SF, you already know the plot. If you love SF, then get **No Such Thing As Gravity**; if you hate SF, get it anyway; it might just make you a believer.

Wittenstein's earlier film, **Betaville**, has the fractured and mysterious air of an oddly dubbed foreign film. On a smaller scale than **Gravity**, but a stylish, funny and intelligent take on New York pretensions and, of course, Godard's *Alphaville*.

**No Such Thing As Gravity:** \$25 postpaid. **Betaville:** \$20. Both from Atomique Film, 110-20 71st Road, Forest Hills, NY 11375; 718/520-0354

## Bizarre Rituals (Dances Sacred and Profane)

From Mardi Gras to New York S&M clubs to an American Indian initiation ceremony, we follow respected photographer and teacher Charles Gatewood as he continues his personal and anthropological explorations of "American subcultures." In this case, Gatewood is looking at body manipulators; along the way, he meets Fakir Musafar, a man whose own body manipulations started as a boy of twelve. Much of the film comprises Gatewood's conversations with Musafar,



VR programmer and beekeeper Jacob Maker is lost in space and time on an atomic weapons test site in *WAX* (or the *Discovery of Television among the Bees*).

as they talk about the spiritual side of body manipulation, and the historical drive to find transcendence through pain. The last section of the film follows Fakir's preparation and performance of the Sun Dance, an American Indian ritual in which the subject is suspended by steel hooks through his chest. After Gatewood meets Fakir, the film takes on the air of a quest, both for the photographer and his subject. A sympathetic and intelligent look at what Gatewood calls "liberation through excess."

Because there is quite a bit of nudity in the film, you must state that you are over 21 when ordering this video.

**Bizarre Rituals (Dances Sacred and Profane):** \$79.95 postpaid from Gauntlet Mail Order Service, 1201 Old County Road/Unit 3, Belmont, CA 94002

### **WAX (or The Discovery of Television Among the Bees)**

Combing archival footage with new video, David Blair gives us this extraordinary feature. As densely layered as any novel, **WAX** is a tale of transcendence. It tells the story of computer programmer and beekeeper Jacob Maker, and the discoveries he makes when he hears the voices of the bees in his hives (he learns that the bees are the link between this world and the land of the dead . . .). But that's

only a small part of the multigenerational, multidimensional story of **WAX**. Moving between his past and his future, Maker travels to the land of the dead, and to Iraq during the Gulf War, ending his time on earth as a smart bomb zeroing in on an Iraqi tank.

The force of Blair's vision is in every frame. Both the writing and visuals are superb. Working on a low budget, he made an end run around ordinary special effects, and used simple computer-generated images to create startling and memorable visions of the bees' world view and the land of the dead.

It's not often that a film or video comes out of nowhere, kicks down the door and demands to be seen. **WAX** is the exception that proves the rule — a low-budget independent feature that heads off in directions most video- and filmmakers wouldn't go near.

**WAX (or the Discovery of Television Among the Bees):** \$36 postpaid from David Blair, Box 174, Cooper Station, New York, NY 10276

### **Something Weird**

It's hard to find a video genre that hasn't been mined to death already. Bob Vraney of Something Weird Video did, though, zeroing in on the softcore sexploitation films that played men's clubs, carnivals and drive-ins from the thirties to the late sixties. Vraney's

company has collected hundreds of hours of these lost films — peep-show shorts, strippers and fan dancers, one-reel nudie shorts. Several of the thirties-era films featured on **Nudie Cuties: Shorts, Loops & Peeps** are innocent and intentionally funny, with a surprising amount of story. The early-sixties trailers from **Twisted Sex** are fascinating cultural documents, full of tension and the crumbling sexual repression of the era. Another winner is **Wrasslin' She-Babes of the Fifties**, a compilation of some of the big names in women's professional wrestling of the era.

**Nudie Cuties: Shorts, Loops & Peeps, Twisted Sex Volume 1 & Wrasslin' She-Babes of the Fifties:** \$23 each postpaid from Something Weird Video, P. O. Box 33664, Seattle, WA 98133; 206/361-3759 (10AM-9PM PST)

## VIDEO ZINES

### **Film Threat Video Guide**

A slick zine devoted to over-the-edge and independent videos (and some film), where attitude is half the game. For example: when the Toronto Film Festival denied them press credentials, the **Film Threat** editors faked a press kit from another, artsier magazine and brazened their way on in.

Interviews range from art-world types like Lydia Lunch and Richard Kerns to unknown zombie/slasher producers. News from the world of indy videos (naming names of videos pirates, for instance) and dozens and dozens of video releases round out each issue.

**Film Threat Video Guide** also distributes a few choice videos that you probably won't find for rent at your local mall. Especially interesting are **Nekromantik 1 & 2**, subtitled German imports that tell the continuing story of charming young necrophiles; they are wickedly directed by Jorge Buttgereit, as both satire and parable reflecting the emptiness of modern German life. **Film Threat** also has two volumes of Transgressive cinema king Richard Kerns, featuring players like Lydia Lunch, Henry Rollins, Leng Lung and Nick Zedd doing cruel things to each other in various Manhattan lofts and alleys. Volume One features music by Foetus, Inc.

**Film Threat Video Guide:** \$12/year (4 issues). **Nekromantik:** \$34.37 postpaid. P.O. Box 3170, Los Angeles, CA 90078-3170; 818/848-8971

### Psychotronic Video

Psycho-Vid Fanzine From Hell!

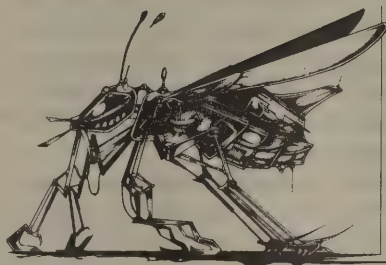
One big difference between a fanzine and a magazine is that most fanzines don't particularly care how they look. *Information* is their reason for being.

**Psychotronic Video** is wall-to-wall data on the sleaziest, the cheapest and the unforgettably bad movies on tape. In one issue: a complete David Carradine (the acid-damaged star of TV's "Kung Fu") filmography and interview, a retrospective look at Brazilian horror movies, a peek at the career of Julie Adams (swimsuit-clad vixen who bewitched the Creature from the Black Lagoon), an examination of Boris Karloff's last decade (and the truth about his atrocious Mexican horror flicks) and pages of star obituaries, all in the tiny, smudged type that video fans and speed freaks seem to love so much. Loads of *Factsheet Five*-style no-frills video reviews, plus obsessively crammed ads for videos no sane person has ever heard of.

**Psychotronic Video:** \$20/year (4 issues) from Michael J Weldon, 151 First Avenue/Dept. PV, New York, NY 10003 ☺

# Zines 'R' Us

BY RICHARD KADREY



### Back Brain Recluse

**\$18/year (4 issues)** from Anne Marsden, 31468 Calle la Purisima, San Juan Capistrano, CA 92675-2547

Unlike American science fiction, which comes from a pulp tradition emphasizing rockets, robots and busty spacebabes, British science fiction comes from a slightly more cerebral tradition with ties to H. G. Wells and Jules Verne. **BBR** publishes some of the most startling and daring science fiction currently being written, emphasizing the experimental and least commercial end of the form. Brits like Michael Moorcock and Diana Reed contribute alongside American authors like Misha and Paul DiFilippo. **BBR** also publishes fine and occasionally brilliant artwork. If you think you know what science fiction looks like, think again.

### Interzone

**\$52/year (12 issues)**. 217 Preston Drove, Brighton BN1 6FL, UK

**Interzone** pretty much revived the moribund British SF short-fiction world in the eighties. Unlike its cousin, **Back Brain Recluse**, **Interzone's** fictions are traditionally literary in style — which is not to say they're stuffy, merely that they are well-written and intelligent tales with beginnings, middles and ends. Not as wild as **BBR**, but not as inconsistent either. Some of the best British and US writers have graced its

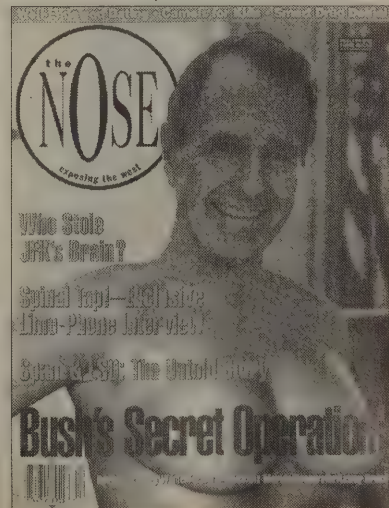
pages, including William Gibson, J. G. Ballard, Karen Joy Fowler, Geoff Ryman, Richard Calder, Lisa Tuttle, and on and on. **BBR** and **Interzone** are great complements to each other.

### The Nose

**\$15/year (6 issues)**. 1095 Market Street #812, San Francisco, CA 94103

Open up the skull of **Spy** magazine and reveal the brain. Using your scalpel, excise major portions of the Smugness and Snide centers, while grafting new Humor tissue into place. Liberally soak the entire brain pan in the IQ-boosting smart drug of your choice, and close. Attach electrodes to the appropriate locations and jolt the beast. When it begins to mumble about three-picture deals, or says, "You call yourself a mad scientist? I've seen scarier stockboys at Wal-Mart," your job is done.

Call the beast **The Nose**, a California-based humor magazine dissecting the West. Buy. Subscribe. You have no choice.



## Technology Works

\$1.50/issue from Paul Moore,  
Box 477, Placentia, CA 92670-0477

**Technology Works** is the strange attractor of industrial and techno music. Designed and executed in a style of barely controlled confusion, its crowded, chaotic pages, full of teensy black type, are as intense and noisy as the music it covers. Interviews and words of wisdom from edge musicians grace each issue. Recent **Technology Works** have covered Paul Lemos of Controlled Bleeding, Groovie Mann of My Life In The Thrill Kill Kult, and Ben Ponton of Zoviet-France. Pages and pages of CD and cassette reviews round out each issue. Reading **Technology Works** is like getting a Ph.D. in noise.

## Science Fiction Eye

\$10/year (3 issues). Box 18539,  
Asheville, NC 28824

The only critical science-fiction zine that matters, because it is the only one that traffics so smoothly in both high and low culture beyond SF. **Science Fiction Eye** casts its gaze not only on SF and SF-related texts, but also on such topics as the work of radical artists like Stelarc and Mark Pauline, the possibilities of consciousness-expanding chemicals and technologies, the death of Salvador Dali, and the soft white underbelly of Silicon Valley.



STILES

Great design, plus interviews with writers like Lucius Shepard, J. G. Ballard, and Pat Murphy, contributions from Bruce Sterling, John Shirley, Kim Stanley Robinson, and Elizabeth Hand, thoughtful and occasionally savage reviews make **Science Fiction Eye** the official thought-drug of the nineties.

## Forced Exposure

\$13/year (4 issues). P. O. Box 9102,  
Waltham, MA 02254

Excellent blend of rock & roll, art and reviews. What separates **Forced Exposure** from other "alternative" music and art magazines is the intelligence and intensity of its editorial style. One recent issue contained a profile of guitar experimenter/improviser Henry Kaiser, an excerpt from Sonic Youth's tour diary, an interview with Beat-influenced postmodern painter Robert Williams, and reviews of Black Lizard Press's line of revived pulp thrillers. **Forced Exposure** is *Rolling Stone* for people who'd rather read the *Journal of Trauma Medicine* than watch MTV.

## Monk

\$18/year (8 issues). 175 Fifth Avenue/  
Suite 2322, New York, NY 10010;  
212/465-3231

Take two slightly off-center guys, add one motorhome and a Macintosh, and you get **Monk**, the first postmodern travel magazine.

**Monk** is travel writing made absurd — stories about people the guys meet in diners, their marriages and breakups, nutcases in New York trying to break into their camper, the cat they adopted at a rest stop, and tall tales from the road (Drag Queens Invade Midwestern High School!). There are even a few celebrity interviews thrown in whenever the Monk guys happen to run into a celebrity. Imagine the David Lynch version of *Travels With Charley*.

## Murder Can Be Fun

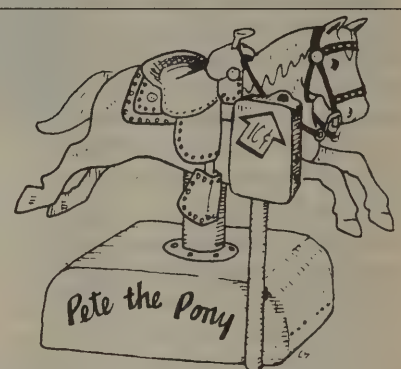
Issues 1-4 \$1.60 each; 5-8 \$1.70 each;  
9-13 \$1.25 each; (*Anti*) *Sex Tips for  
Teens* \$1.25 from John Marr, Box  
640111, San Francisco, CA 94109

If Hannibal "The Cannibal" Lecter ran a fanzine out of his asylum cell, it would probably look a lot like **Murder Can**

**Be Fun**. They're all here — your favorite mass murderers, serial killers and natural disasters documented with painstaking care. If this sounds like bad taste, it is, but it's bad taste with a lot of humor and intellectual rigor.

Editor John Marr has also spun off his taste for the absurd into (*Anti*) **Sex Tips for Teens: The Teen Advice Book 1897-1987**, a collection of frighteningly moronic etiquette and advice tidbits from Pat Boone and other social scholars.

## Sidney Suppey's Quarterly & Confused Pet Monthly



### Matt Householder's Favorite Example of Virtual Reality:

"It's not really a horse;  
you don't go anywhere;  
and you have to pay money to do it."

Published irregularly. \$2/issue from  
Sidney Suppey Foundation c/o Candi  
Strecker, 590 Lisbon, San Francisco,  
CA 94112

A funny and personal collection of writings, ruminations, theories, clip-pings, stolen and original art and more, usually on a single topic. Even when she is telling you how something really stinks, editor Candi Strecker's point of view is more ironic and funny than furious. Of special interest to *WER* readers is the August 1991 issue, where the editors give their less-than-reverent report on the Whole Earth-sponsored virtual-reality-fest, Cyberthon.

## Girljock

\$12/year (4 issues) from  
ROX-A-TRONIC, 2060 3rd,  
Berkeley, CA 94710

Reviewed in *WER* #72, **Girljock** —





“the magazine for athletic lesbians, but not entirely about sports” — has gone through a startling adolescence, sprouting from a mostly hand-scrawled digest-sized zine to a full-bodied 8½ x 11 format with readable type and halftone photos. **Girljock** remains, however, the same irreverent collection of stories, cartoons, confessionals and interviews it was when editor Roxxie first said, “Fuck the Well of Loneliness. Goodbye to all that. We’re here to have fun.”

**Body Play & Modern Primitives Quarterly**  
**\$45/year** (4 issues; sample copies \$12) from Insight Books/Subscriptions, Box 421668, San Francisco, CA 94142-1668



Sure, with great force one can belt or corset any waist down 5 or 6 inches in minutes. But the visual is only a momentary experience.

Fakir Musafar, one of the stars of Re/Search’s notorious **Modern Primitives** (WER #63, p. 72), now has his own body-modification zine. It’s quite a beautiful document, on heavy paper with excellent photos, both new and archival. Topics in the first issue include *What is Body Play?*, *Corsets* (tiny-waist fetishism), *Branding* (just like on cattle — and you thought your piercing made you butch), *tattoos as jewelry*, and the yogic practice of *uddiyana bandha*, in which the practitioner literally pulls the belly back into her/his body, causing the midsection to all but disappear. Of course, there’s also a resource directory and information on related zines and books.

### It’s a Wonderful Lifestyle

**\$4/issue** from Candi Strecker, 590 Lisbon, San Francisco, CA 94112

Candi Strecker (of *Sidney Suppey’s Quarterly* & *Confused Pet Monthly* fame)’s trilogy of seventies culture. In the first issue you get disco, scary clothes, scarier shoes, cool seventies cars, Mary Hartman, and a discussion of the film that became the moral barometer of a generation, managing to be both pacifist and fascist at the same time — *Billy Jack!* Parts two and three are in the works.

### Intertek

**\$4/issue, \$14/4 issues** (2 years; overseas \$5.25/issue, \$18.25/4 issues) from Intertek c/o Steve Steinberg, 13 Daffodil Lane, San Carlos, CA 94070

Smart, informative and serious (as opposed to flashy) cyberzine by an editor who knows what’s going on. The newest issue covers Virtual Communities, groups of people scattered all over the world who are nonetheless intimately linked by computer bulletin boards and conferencing systems. Previous issues have covered designer drugs, the world of hacking, and ethics in cyberculture.

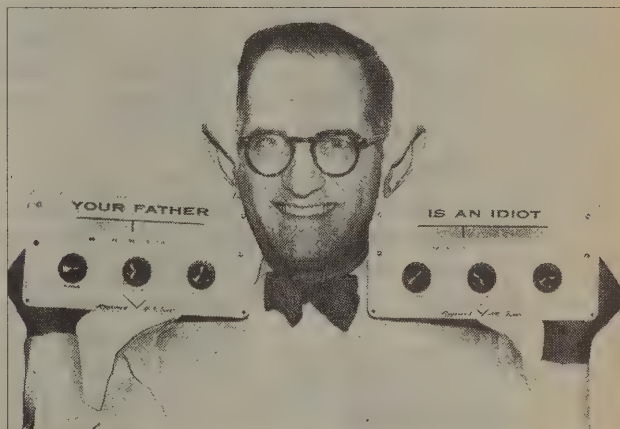
### Logomotive

**\$18/year** (4 issues; requires signed statement of age); **\$5/sample** issue. P.O. Box 3101, Berkeley, CA 94703

**Logomotive** calls itself the “little sex zine that does,” and with its second issue it does indeed. This is one of a new breed of sex zine that calls itself “queer,” as opposed to gay or bi or straight or bent at 36 degrees. The term “queer” in this context means that **Logomotive’s** sexuality and eroticism are all over the map, appealing to almost anyone who is curious and open. **Logomotive’s** nonfiction is smart, and its fiction ranges from hot to hilarious (sometimes both). Great graphics, too.

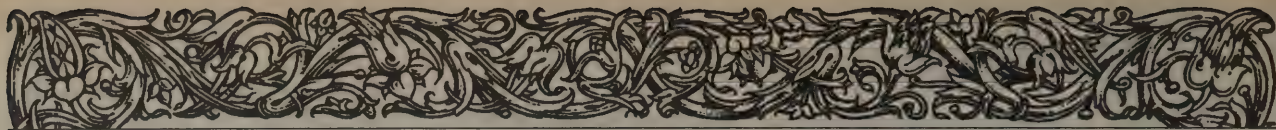
### Answer Me!

**\$4.50/issue** (\$3.50 bulk mail) from Goad To Hell Enterprises, 6520 Selma Avenue #1171, Hollywood, CA 90028



Simply put, the editors of **Answer Me!** represent everything Pat Buchanan would like to destroy in this world. **Answer Me!’s** proprietors, Mr. and Ms. Goad, don’t care what you think, don’t like you, and would probably like you even less if they met you. Their zine carries on this neighborly and upbeat tradition with such timely and inspirational articles as “The Family Must Be Eliminated!,” *People Ruin Everything*,” “Chicks ‘n’ Cars” and the lovely duet, “I Hate Women/I Hate Men.” Each issue is rounded out nicely by interviews with such uplifting characters as exploitation film director Ray Dennis Steckler, porn king Al Goldstein, Timothy Leary, and Anton LaVey, the guy who pretty much made satanism a paying concern in America.

Reading **Answer Me!** is the equivalent of a cultural mugging made amusing. ☺



# When A Bookstore Becomes A Library

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IBRARIES HAVE ALWAYS BEEN PRIMARILY FOR INFORMATION RETRIEVAL. Bookstores have been primarily "user-friendly" places for browsing, and are the less ecological of the two. Putting these two technologies together, Opening Books opened on May 12, 1989, as a place that looks exactly like a bookstore, but functions exactly like a library.

Sharing is the most basic ecological principle. It implies diversity. Diversity plus communication equal a healthy community. The purpose of Opening Books is to allow people to have control over the quality and range of information available to them. It emphasizes a great human trait — people tend to choose quality when they have the choice.

By design, Opening Books is making *reuse* an attractive option. Elin Whitney-Smith ended her article "Information Doesn't Want" (*WER* #72, p. 38) with the statement: "The group with the free-est information wins."

**BY CLERE  
ENGLEMERT**

In a healthy biosystem, more than one group wins. The quickest winner is probably whoever designed their free information to be the most attractive.

It would seem that merchandising is an invention of capitalism.

People vote with their money, and merchandising is aimed at presenting the goods as appealingly as possible. Bookstores' survival has depended on how well the books are merchandised, which often means shelving a title in more than one location.

There are many excellent areas of study that do not survive current library shelving systems. Lesbian/Gay fiction, African-American fiction and Natural Healing are examples of sections that lose their integrity when they meet the Dewey Decimal or Library of Congress systems. Bookstores have complete freedom to create whole sections when there are sufficient books and interest. No new bookstore stays in business very long without evolving a system to know and find what is in stock (information retrieval).

Titles and authors' names are applied in Braille to the covers of books sold at Opening Books. This will allow blind people to independently browse a "bookstore" for the first time. Our local public library — with which we are on extremely good terms — offers free readers to blind people.

Opening Books' policies are unusual and in some cases (we think) unique among bookstores. They include:

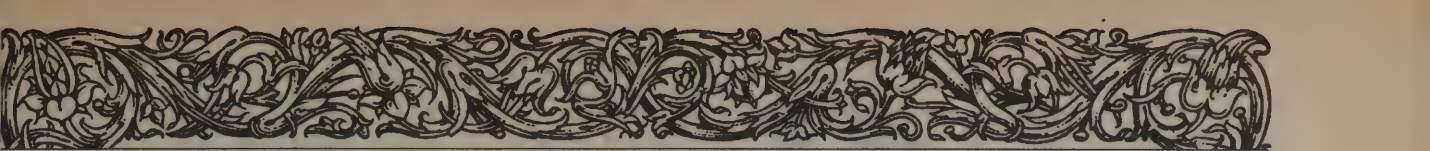
*Accessibility* — we're open seven days a week, 365 days a year, 10 am 'til 10 pm (until midnight on Friday and Saturday).

Browsing is free and encouraged. In order to check out items, a membership is required. Memberships begin at \$25 for three months (less for children) and get progressively cheaper per length of time. Memberships can be traded for books, magazines, audio and video tapes, CDs, LPs, and framed prints. People's natural generosity is encouraged by providing a place where their books can effectively circulate.

Memberships can also be bartered by work exchange — a common example being \$10 per hour for typing.

*Full service* — Any book that's in the library can be ordered. If the book is out of print, it is not uncommon for us to have it the next day.

**Here's a hybrid business based on service. Clere Englemert owned two other bookstores before starting this venture in the shadow of the Cumberland Mountains in the Five Points district of Huntsville, Alabama. Says he, "I used to watch people walk into those stores and then walk out without buying anything — without having their needs met — and I started asking myself, 'Why?'" —Richard Nilsen**



*Comfort* — What's comfortable to one person may not be that way for the next person. From wicker to bentwood to overstuffed, the chairs at Opening Books are clean, comfortable, and inviting. One can sit and read inside or outside. We have an enclosed courtyard with fragrance garden.

*Multimedia* — A lot of people don't use books for information/entertainment. Video is the medium of choice for a lot of people. CD is the audio of choice for a growing number of people. We make sure that people can't miss the fact that we've got these media.

*Co-op* — For lifetime members of Opening Books (no \$ need be involved), anything purchased or ordered through the gift shop is sold at cost. The option of buying at cost is also offered to anyone who will donate what they buy to the library. The total amount they've spent can be applied toward their membership. This is beyond win/win, because the entire community is enriched.

*Generosity* — The checkout period for all items (except videos and current issues of magazines) is three weeks, renewable by phone for another three weeks. Videos and current issues of magazines can be checked out for three days and are not renewable. Letting people check out magazines has resulted in a marked increase in magazine sales. It allows people to inspect the merchandise at their leisure. Overdue fines are not emphasized.

They are a dime a day (including videos).

**O**PENING Books had no guide or model. The purpose of these words is to let others know how to evolve retail into something

**Letting people check out magazines has resulted in a marked increase in magazine sales. It allows people to inspect the merchandise at their leisure.**

much more ecological than it currently is.

In order to conform to 501(c)(3) nonprofit regulations, the retail sales space must be 15 percent or less of the total space used. Ditto for how the staff uses its time. What we sell in the gift shop is strictly literacy-related. These items include t-shirts, buttons, jewelry, bumperstickers, posters, bags, and "art objects" — all of which have words (English or not) or readable symbols. We also sell cards, blank books, coloring books, bookends, bookmarks, recovery gifts, and maps.

As of this writing, Opening Books has 350 members. The simple "two-card system" used in libraries works for us. We have nothing

against bar-code computer technology — but we can't afford it and we don't need it. Our system also offers a privacy of which a few members gratefully take advantage. If people do not wish their names to be a permanent part of the checkout card, they can simply write in pencil, then erase them when they return.

Opening Books opened on a tiny amount of money (loans) and a vast amount of faith. After two years, the IRS finally determined that we are in fact 501(c)(3) nonprofit. We are now applying for grants and look forward to paying off all our debts within a few years.

Our gift shop has suffered from lack of stock, but as our inventory slowly builds, so do our sales. The three-year model of our struggling yet successful existence presents a strong case for the feasibility of this visionary reality in any community.

If it can be done in Huntsville, Alabama (Alabama is #3 in illiteracy in the nation), it can be done anywhere. ☺



**END OF THE VOLUME.**

Some of us who were kids in the forties and early fifties sought an antidote to the boring pop music that infested the prime time of virtually every major network radio station. We discovered jazz — traditional Dixieland, bop, and cool. The transparent structure of Dixieland made it easiest to understand. You could dance to it. Hearing it live was in thrilling contrast to the orderly, sappy stuff played to a society of squares. The mostly ancient musicians were friendly. Many were black. We learned a lot. Here's how it went for Marlene Lily, now a self-proclaimed "activist" in Santa Rosa, California. It went much the same for me.  
—J. Baldwin

**I**N 1956, AT THE END OF MY FRESHMAN year in high school, my class had its first official social event — a dance at “the Barn,” a large, dry nightclub for kids on the outskirts of Rochester. Since my school was all girls, it was up to me to find an escort. Although my social life had been busy in the seventh and eighth grades at my co-ed grammar school, being in an all-girls’ school had slowed things down. I couldn’t think of anyone to invite.

## *We're Gonna Have A Good Time*

BY MARLENE LILY



## An American Spiritual Path

One day I remembered a boy I had seen on the school bus, but had never talked to. He had been a year ahead of me at my Catholic grammar school, and was now attending the boys' Christian Brothers high school. He lived less than a mile away. I saw his older brother all the time, because he hung out with the boy next door. He was a handsome, smooth, socially adept fellow who always made me feel inadequate and awkward. But Jimmy seemed shy and quiet, open and innocent. He was thin and sandy-haired, with huge, cobalt-blue eyes that tilted down at the outside corners, giving him a sad expression if he wasn't smiling. I had never heard of him having a girlfriend. I decided to invite him to the Barn.

We went. I had a good time in a low-key way. It was always weird to be driven on a date by somebody's parents, but that was the only way to get there. I could feel Jimmy's shyness, his discomfort with conversation, and it inhibited my usual exuberance. But I liked him. I had the feeling he liked me. Nothing intense, nothing dramatic. I didn't see him during the summer. The following fall, when his school had a dance, he called and invited me. Thus started a romance that lasted four or five years, and a friendship that continued off and on for fifteen more.

Jimmy was shy and quiet — at first. But it soon developed that we both loved to dance, and dance we did. He wasn't shy on the dance floor. Dancing made him smile, and I loved his wide, infectious grin. He paid close attention to the music and expressed its nuances with his body in a way that was uniquely his. Halfway through his junior year, he began drinking, and that was the end of any residue of shyness that might have remained from the days before he had girls in his life. When alcohol entered the

picture, he stopped being a "good boy" and became a hellraiser. His grades dropped, and he often concluded his school day with a period of detention as punishment for cutting up in class. He didn't care.

He was the youngest of three children, Irish Catholic on both sides. He had an uncle who was a priest, a sister who was a nun. His father owned an upscale men's shoe store in the old section of downtown Rochester. His mother, a petite woman to whom he referred as "my little round mother," was from a wealthy family and had never worked outside the home. I later realized that she had a bit of a drinking problem herself.

Jimmy's father was good-looking, socially comfortable, well known among the prosperous merchants and professionals who patronized his store and belonged to the same country club, or clubs like it. When he wasn't at the store, he spent a lot of time playing golf. Jimmy admired his father, and he, too, became a golfer. Once in a while, his picture would be in the paper if his school's golf team won a particularly challenging match.

I don't know exactly how Jimmy discovered Dixieland jazz; I just know that he was the one who introduced it to me. There were two Dixieland bands in our area — Max McCarthy and the Dixieland Ramblers from Rochester, and the Salt

City Six from Syracuse. Once in a while, they would get together and have a "battle of the bands." For us, that was one of the big events of the year. All the musicians in the Ramblers and the Six were white, and the music they were playing in the late fifties was actually a revival of the black music of the twenties and thirties. But its age didn't matter. It was wonderful music and they played it well and it spoke to us in a way that most rock'n'roll never did.

The popular music we liked to listen to on the radio (Dixieland wasn't played on the radio) was rhythm and blues, but we never had a chance to hear that live. In fact, it had only been on the radio for a few years. It was black music, so-called "race music," and there weren't enough black people in Rochester then to bring the Coasters or the Drifters or the Olympics or Chuck Berry to town. And if there had been, the color line was still substantial enough that we probably wouldn't have chanced crossing it.

But the Dixieland rhythms and harmonies, the tension between the horns during their close-harmony blue climaxes, thrilled us to our souls, and we danced and danced and danced. I kicked off my shoes and wore out my stockings and got blisters and calluses on my feet every weekend. Our enthusiasm, and Jimmy's endless promotion, drew all our friends into it, too, though they never loved the music the way we did. If the Ramblers were playing fifty miles away, Tommy would use his Irish gift of gab, and the whole gang would end up in Albion or Canandaigua. We knew the musicians personally, they sat with us during their breaks, and once in a while we would stop and see Max McCarthy and his wife and kids at home at their place on Lake Ontario. I can still hear Max hollering, "Ashes to ashes, and

dust to dust. Even for monkeys, Dixieland is a must!" For Jimmy and me, at fifteen, sixteen, seventeen, that little poem was like the gospel.

Once a year, we got a chance to hear the real thing — Black Dixieland — live, but we couldn't dance to it. Louis Armstrong came to the Eastman Theater, Rochester's equivalent to Carnegie Hall. We wiggled in our seats as Trummy Young pulled the slide on his trombone and Barney Bigard wailed on clarinet, grinning back at Armstrong as if he could see us, wincing as he hit the high notes on his horn. Armstrong radiated love and good humor and wisdom and understanding all over the world, and the rays from the sun that he was fell on us and blessed us. His smile was real. His love touched and kindled our hearts.

At our house parties, we danced to his records. Our favorite LP was *Louis Armstrong Plays W. C. Handy*. We knew the words to all the songs — "Beale Street Blues," "Memphis Blues," "Loveless Love," "Long Gone John From Bowling Green" — and sang them as we danced, without thinking much about the life they were talking about: the life of the bars and brothels and streets, prostitution, drinking, racism and its effects on sexuality, the inequities of the legal system. The music was happy music, even if the stories were sad. We were kids out for a good time, and we had a good time. We even sang "Aunt Hagar's Blues," without understanding that Armstrong was telling us about the false church, the church created by the people who created "loveless love." "If the devil brought it, the good Lord sent it right down to me," Armstrong's wife, Velma Middleton, sang, talking

about the blues and the conflict between secular and sacred music. In Armstrong's presence, that conflict became a foolish mirage. Any distinction between the sacred and the profane vanished.

The fun Jimmy and I had, our youthful exuberance, was real, but there was a subtext that grew more sinister with time. One element was alcohol. If Jimmy and I went out on Friday and Saturday nights, on one of those nights he would end up so drunk he couldn't walk. One time he fell out the car window, leaning too far when he had to vomit. Many times he threw up — out on the golf course at the country club, in the yard as he attempted to walk me to the door, in the parking lots and men's rooms at the nightclubs we frequented. All our friends knew about it. He was never allowed to drive. But no one had any suggestions what could be done. It was just one of the givens of our situation, like my glasses or Sue's red hair. From the time he was sixteen,

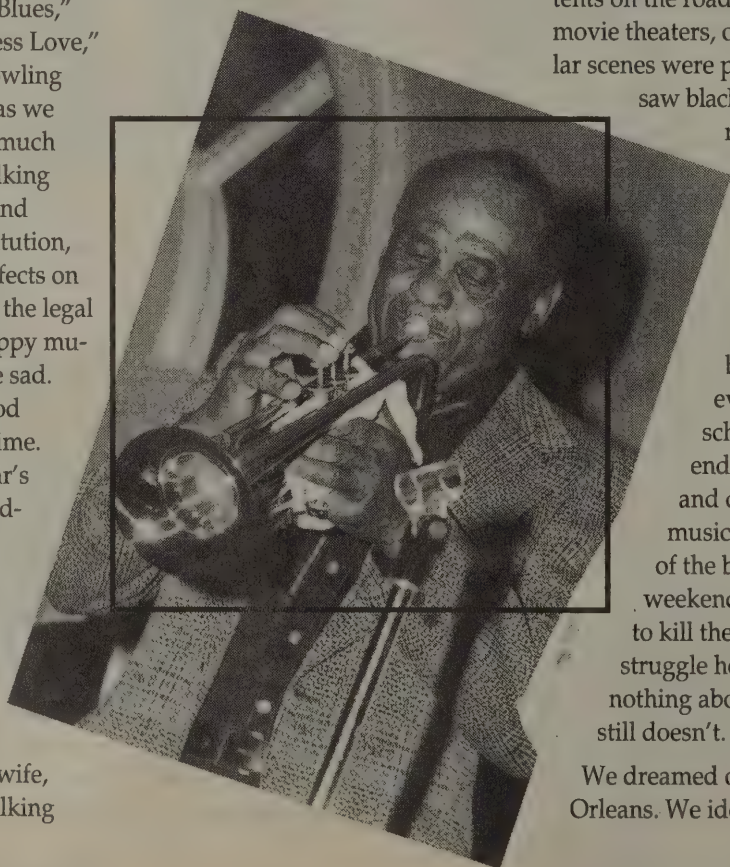
O'Rourke was a drunk. Nobody shunned him or hated him for it, we just worked around it.

The other sinister element was racism. We lived in an all-white suburb of Rochester, New York. Although there were quite a few Jews living there, to us, the Catholic-school kids, even Jews were exotic. There were very few blacks living in Rochester in the fifties, none in the upper-class country-club set we hung out with. One had to go looking to find black people. And yet, out of nowhere, in this otherwise mild-tempered young man, would suddenly come the most virulent racist attacks. One summer day, as we drove along one of the Finger Lakes en route to a friend's cottage, a black man was standing beside the road holding a suitcase, about to get in a car. Jimmy leaned out the window and screamed "Drop that suitcase!" from a few feet away. The startled man was terrified — and did what he was told. The suitcase popped open and spilled its contents on the roadside. In darkened movie theaters, on city streets, similar scenes were played out when he saw black people. Yet I have

no reason to think

he ever had even one unpleasant encounter with a black person that was initiated by the black. And every night after school, every weekend, he was listening and dancing to black music, to some form of the blues. And every weekend he was drinking to kill the pain of an inner struggle he consciously knew nothing about, and most likely still doesn't.

We dreamed of visiting New Orleans. We idealized it. We sang





Ed Lawless

about "New Orleans, land of dreams, you'll never know how nice it seems or just how much it really means," and about Basin Street, "the street where the light and dark folks meet." We sang, "Do you know what it means to miss New Orleans and miss it each night and day," as if it was our home town and we had been away for twenty years. I persuaded my senior class in high school to take "New Orleans at Midnight" as the theme for our senior prom, and we lined the gym with seamless paper and painted scenes of New Orleans all around the walls. Behind the bandstand I painted lifesize portraits of Max McCarthy and his band, playing their hearts out. And yet "the light and the dark folks" never did meet in Jimmy's life.

Once, in the late sixties, I talked to him on the phone. We hadn't seen each other in seven or eight years. I was living in California, and he was still back in Rochester. After learning that I was separated from my husband, one of his first questions was, "Have you ever gone to bed with a black guy?" Then he told me his wife had left him for a man she met in the elevator of their apartment building — a black man. That was all he could see in the situation. His own drinking problem, of course, wasn't even part of the picture.

It was another fifteen years before I began to see my own attraction to substance abusers and connect that with my father's alcoholism, my mother's denial. My father's drinking problem was becoming apparent right about the time I invited

Jimmy to that first dance at the Barn. But Jimmy was only fifteen then. He hadn't begun to drink. How did I know to choose him? How did I know my path would lead through a forest of codependent relationships, echoing that of my parents? I have no answer. I guess I could see Jimmy was sensitive, innocent, open, responsive. Those were the qualities that attracted me. Those are the qualities that our materialistic, money-oriented culture seeks to kill, wherever they are found. When we discover this, we often take on the job ourselves — and kill our own sensitivity with drugs and alcohol, as he did. And then we project it on other innocents — like the black man with the suitcase — and attack them.

Looking back, it seems obvious that Jimmy should have been a musician himself. Why didn't he pick up a horn instead of a bottle, so he could express his pain instead of trying to

kill it with booze? Why didn't he actually study the bass instead of just strumming Max McCarthy's string bass when he was drunk, until he got a blister on his thumb? Did it ever occur to him that he could use music to express his feelings? Not that I know of. The only remedy his family culture offered was self-medication — alcohol. His imagination stopped there.

I didn't know, in the late fifties, that my dancing to Dixieland jazz was a religious experience. My idea of religious experience was getting dressed up on Sunday and sitting in Our Lady of Lourdes Church for an hour. I didn't know that Louis Armstrong was the high priest of a church I had yet to discover, the church of Love. I didn't know that the ecstatic moments I experienced on the dance floor — as I moved past mere bodily exercise into a semi-trance state in which I had endless energy and endless lung power, a state in which each instrument in the band instructed a different part of my body how to move — were building the foundation of a temple for the Holy Spirit. I just did it because the music spoke to me, because it felt good. I didn't give it any thought at all. I was just "doing what came naturally" — having a good time.

It was thirty years later — when I joined a black Baptist church in 1987 — that I discovered that "having a good time" is one of the things black people consider essential to "church." Having a good time was the *last* thing most white people expected from church, particularly the American Catholic church of the fifties.

One of my favorite contemporary black gospel tunes contains the line, "*We're gonna have a good time! Don't you want to go? Oh, children, Jesus is calling. Jesus is coming back. Don't you want to go?*" That idea, that phrase — "have a good time" — is found in many gospel songs. My pastor at Community Baptist Church often introduces the choir with the words, "Let's have church!" To him that means, "Now that the business is over, let's sing and shout and have a good time!"

In 1983, I was at the Siddha Yoga ashram in Oakland. I decided I wanted to hear some black gospel music, and asked a black woman in the lobby, a woman I had never seen before, to recommend a church that had a good gospel choir. "I think you should go to St. Columba's Catholic Church right down on San Pablo," she said, turning and pointing north.

"But do they have gospel music at a Catholic church?" I asked, dubious.

She repeated the words: "I think you should go to St. Columba's Catholic Church right down on San Pablo."

I said to myself, "This woman is trying to tell me something. I'd better pay attention." The next morning, I went to St. Columba's. The music left a lot to be desired. But after the service, the sparse congregation gathered in the center aisle and held hands in a circle and said the Lord's Prayer. I had never seen anyone hold hands in a Catholic church, and the simplicity of the gesture, along with the words of the prayer and the physical contact, touched my heart. I began to cry. I couldn't stop. The tears poured out. When the prayer was over, and I was wiping my eyes, an old black woman came up to me and took hold of my hands and said, "I saw you when you were having a good time!"

I looked at her in astonishment. "Where?"

**T**hese days, when one of the many fine soloists at my Baptist church begins to sing, I sometimes feel I'm back in the Eastman Theater in 1958, listening to Velma Middleton. The words are different, the subject matter is different, but the rhythms and the harmonies are the same. The feeling is just as intense, maybe more intense. It's not unusual for people to cry in church; in fact, it's expected. There are boxes of tissues situated all around the sanctuary to be used by people who are weeping — for whatever reason. I feel no embarrassment when I'm moved to cry. Sometimes I go home exhausted and have to sleep for the whole afternoon.

When the hormones of adolescence were coursing through my veins, songs about love lost and found







touched my deepest feelings. And it was feeling that I was seeking — and finding — in black music all along. Now that I'm nearing fifty, and the end of my journey is in sight, songs about human love are not as appealing as songs about Divine Love. I'm more interested in where I'm going than in where I've been. And after four years in the choir at Community, I'm still thrilled to be no longer in the audience, as I was in the fifties, sixties, and seventies, but up front with the singers and musicians who back up the soloists, the magnificent soloists, who are everyday people — nurses and office workers, teachers and sales clerks and deliverymen — not media-made stars. I'm thrilled that my voice is part of the harmony, my clapping hands are part of the rhythm I've loved for so long. I marvel that I found my path to sanity and reality in the midst of the confusion our world offers to

young people. I marvel even more that it was not where anyone said it would be, but "where it felt good." An old R&B song said, "Come on, let me show you where it's at! Come on, let me show you where it's at! Come on, let me show you where it's at! The name of the place is — 'I like it like that!'"

Jalaluddin Rumi, the great thirteenth-century Sufi poet, said, "Pay attention to what draws you." Carlos Castaneda said, "Follow a path with heart." I didn't understand what that meant when I read it back in the early seventies, but without understanding, I was doing it, led by grace and by the responses of my own inner being.

What happened to Jimmy? I haven't talked to him in sixteen years. The last I heard, his father had died and he was running the shoe store. A few years ago, I sent him a note

about my church and the choir — enclosed a newspaper article about a white man with lung cancer who was singing in the choir. There was a color picture of him in his choir robe, singing with an oxygen tube in his nose. When he died he had a black gospel funeral. After all the times Jimmy and I sang and danced to "When the Saints Go Marching In," knowing it was a New Orleans funeral song, I actually sang it at a funeral, and I wanted him to know that. In my note, I asked him if he still had the *Armstrong Plays W. C. Handy* record, and if he did to make a cassette of it for me.

He didn't respond. It didn't really matter. A few weeks later I found a brand-new reissue of the record in a store. The spirit of Louis Armstrong must have heard my request. ☺

# "I GOT MY MISSISSIPPI PLATES TODAY."



## Student Nonviolent Coordinating Committee

6 RAYMOND STREET, N.W., ATLANTA 14, GEORGIA • 688-6331

702 Wall Street  
McComb, Mississippi  
39644

(601) 684-9414

*I spent '64 and '65 in southwest mississippi, working for SNCC [Student Nonviolent Coordinating Committee] in voter registration/education projects. During that time I corresponded with my friends Ed and Jane, and Jane saved my letters.*

*I think I come across as a recently educated white sexist, almost racist, twenty-three-year-old horndog. The language is archaic because the word Negro was what we used before Rap and Featherstone and Stokely and the fellows came up with Black Power, but some of the ideas still may have some application. If nothing else, a fuzzy snapshot emerges of what it was like down there in those years. —jd*

*"One Man, One Vote"*

*It's always a treat when jd smith, intrepid adventurer and consummate storyteller, sends us something to read. Forgive me for doing some editorial snipping-to-fit. —J. Baldwin*

*When I started working for Whole Earth in 1977, jd was already a legend of sorts around the office; almost everyone had some colorful or apocryphal tale about him. He moved back to the Bay Area in the early eighties, and I got to hear the originals.*

*jd last graced our pages in issue 28 — another staff issue of sorts. His latest incarnation, in Idaho, is as father and caretaker of Clifford Smith, born 10/19/91. — Kathleen O' Neill*



My parents have outfitted us for the winter, so I have two new pairs of boots: one like the western boots I had, and the other a pair of knee-high black engineer boots with logger heels to which the only conceivable complement would be an eight-foot bull whip and some serfdom to tyrannize. . . .

I am anxious to get started, feel some kind of John Brownism sneaking into my eyes, a certain impatience with myself, the compulsive desire to create something before senility gets me. People with kids get rid of it that way. I go to Mississippi.



McComb is quiet for awhile. As you have probably read, they arrested three men here and charged them with possession of explosives, which can carry the death penalty in Mississippi. These three might be responsible for two of the bombings, but that leaves fourteen unexplained. . . .

My activities center largely around digging into the shitpile of fear and trying to come out with some kind

of sensible community organizations. Right now the most which is possible in the way of real action is just setting up little four or five person gatherings at a few homes and attempting to instill some kind of group feeling. People are afraid to meet, because of the harassment they receive from everyone in the vast networks of little pressure groups down here. In one real sense, I am involved in organizing the unemployed, because few people who are working are willing to take the chance of being dismissed because of their association with me. We are coming to a breakthrough, though. McComb is going to be another Selma, with a lot of violence before Spring.

we set up television sets in the churches tonight and tried to give some meaning to the drivel the networks put across. when it was first announced that

johnson had enough electoral votes to carry him across, the whole goddamn crowd went jubilant like it was freedom now, and panacea uber alles. i didn't have nitty gritty enough to stand up and pull a tirade thing, so just tried to instill some constructive pessimism. hope is really a bitchy thing to fight, but i feel it is a stifling influence in the movement. religion, for instance, is the big block to any real revolutionary progress in the people. there is a wriggly streak of god-is-going-to-lead-us-all-out-of-this-terrible-thingism. sure, and so's LBJ. what we need is a good field of despair and disbelief in institutionalism. then we could more easily start the foundation construction which is required to build a really dynamic personality out of a person who has been 'buked and scorned all his life. as long as god and lbj provide easy psychological hitching posts, we will have to work within their spheres and try to subliminally cut away the tethers. shit, what a metaphor.

☞

We keep watch here 24 hours a day, partially to receive phone calls of import and mostly as some kind of deterrent to the bombers. I saw the Cofu office in Vicksburg which was bombed last week. The distressing thing about that particular bombing was that it was obviously meant to kill; the bomb had been placed underneath the house (up on stilts), in the exact center by someone who had climbed up a hill and through bushes behind it. There were eight people sleeping in the place and the bomb completely

demolished it, collapsed the walls, and dropped the roof, without injuring anyone. They have much better bomb makers over there than we have here, because the closest they have come to really doing a first-rate demolition thing here was the Society Hill Church. Someone kept local talent from developing when they caught those eleven people last week because among their weapons were two army-issue hand grenades and fifteen pipe-bombs, pieces of two inch lead pipe filled with powder and with firecracker fuses. Up until now there has never been an extensive use of shrapnel devices. The southern mind is childish in this respect, they always just tied a few pieces of dynamite together and then twisted the fuses, so you get a series of little blasts and quite a few misfires. In one sense, this is comforting, because it makes one feel that the intelligentsia, little though it may be, isn't taking part in the planning. If anyone of intelligence were involved it seems that they would have developed some kind of impact explosive, something they could be sure would explode and burn when it hit the side of a building. Knock on wood.

☞

There are no neutralists here, either they're fer ya or agin ya, so the concept of getting white commentary is dead. The only way it could be approached is through staff people, or tagging along with some brave citizen in his daily existence. Ten minutes after you show up in McComb, the police have a whole network of information on you, and manage to stop you in the first few days to get all the goodies,

which they must pass on to the FBI, because the Friendly Brothers of the Individual know all about you once they see you. The mass media are controlled by Jews, of course, and they are every bit as interested in spoiling the white race as the niggers are, so a cameraman is necessarily the agent of the Jew, Commie, Northern, Nigger, Federal Conspiracy, all trying to despoil the virginity of local twelve-year-olds and are attempting to occupy the sacrosanct soil of the Magnolia State.

☞

M.L. King is bourgeois (or however it is spelled) to most of the people in mississippi. the big process in the movement is that of getting the people to define to themselves the meaning of "freedom" in "freedom now." to the NAACP it seems to mean driving a wedge into society as it exists, leaving the surface of society unchanged, which makes them a pretty backward group here, because most of the people don't give a shit about ever wearing a tie and coat or working in a bank or eating at the Holiday Inn. the people, i keep finding, know what it takes in america before their problem is solved. there is little hero-worship of presidents other than roosevelt (who installed voter education classes in mississippi) and kennedy, whom the people feel died for them in much the same way that many of them die unexpectedly every day. people wanted johnson to win over goldwater, but with the reservation that they knew that he was almost as much an opponent in the struggle as stennis or eastland. the federal government is no



hero to the negro people in mississippi. they are aware of its failings, of the way it works, or doesn't work. i guess my point is that negroes here understand the workings of government and see more clearly what they want than anyone i ever met in a boston bar.

↳

A favorite auto sticker down here reads: "You are now in occupied Mississippi, proceed with caution." I have the same thing on my car with the word "occupied" edited out. Tends to bring out the malice in the street-corner hate societies. . . .

Don't expect any activity against the eleven whites arrested for the bombings, except fifty dollar fines or something. A couple of them are out on bond and the other in a nut house.

Am looking for better things from the FBI down here. They sent in a bunch of northern ones, and the two new ones I met today were almost sympathetic, in a shoe-salesman way.

↳

I had a revelation of sorts yesterday. was sitting listening to a group of people discussing the freedom democratic party, watching them work out all the ideas, in their own terms, that i could have ever given them, feeling a real renaissance of the people, and was suddenly

clothed with the idea that we are fighting a winning battle down here, that the seeds are beginning to push up through the surface of society, and that the whole world might well be changed because of mississippi. it came as an awareness, and probably lacks credulity on the rational level, but for me it means a sudden awareness of the faith i have and had never really looked at. one never really stops questioning himself down here about his purpose for being here and his effect on the situation. i have really been cleansed of theory in mississippi, and believe that most of us have. the dialectic may have something to do with what i am doing, but thinking in terms of synthesis, antithesis and that shit could only draw one away from the concrete thing we are working on. i find it difficult to believe that marx could ever have been a successful revolutionary, and have come to think that men like trotsky never knew the people because of his writings — it is really impossible, it seems to me, to boil down human, essentially human, things into categories like class struggle. . . . there may well be such an eternal event as class conflict, but pointing this out to a worker means nothing to him because he *feels*

the same ideas in a totally different, real, form. a negro may tell me that the white man beat him and chased him off his land because there was oil underneath it, and that the white man is a bastard and a thief. the way to organize the man is not to tell him that this is the plight of the proletariat and that men must lock hands around the world to correct the evils done their class. maybe tell him that there are two or three other men with similar experience and that they should get together and talk it over, tell their story. if they form a grocery store over it that is all right with me.

↳

everyone else is gone from the project for a few days, some with the kids, some home, and some to washington for the challenge, so i have some time for meditation unless they bomb us again. right now a very lovely local girl is in the kitchen cooking up a mess of red beans and rice, cornbread, and ham hocks. she's doing this unsolicited and unprovoked, an example of how well the people have received us, and how well they provide for us if we need anything. the girl is something out of an african flower drum song, afraid to talk to me; embarrassed in a way because i don't know exactly how to express to her my thanks. the food smells good, earth good and solid. . . .



there is such a wealth of visual material down here that one would have to have another dorothea lange team to do it any justice. i find that it is impossible for me to get really going with a camera because i am too much in the circumstance, and a camera impairs certain human relationships i am trying to establish. i do hope to do some things on the steptoe family though, when marshall and i move out there and live with them. they live in a real tarpaper house, with great, splintery, used wooden floors, and partitions instead of rooms. the family is such an exciting one visually. as you can see, steptoe himself is a masterpiece, and his daughters are truly beautiful. the youngest is fifteen, and has weird, wonderful green eyes; about the color of mine, but stunningly imbedded in a sort of deep camel colored skin. the girls are marvelous, real soul-sisters of mine, with a great family pride. when they are introduced to someone they stick out their hand, look the person right in the eyes, and softly, yet not modestly, say "steptoe," that's all, no miss, or mrs, or first names, just "steptoe." . . .

watch malcolm come around. i saw him on t.v. the other night, in mississippi, yet, and the in-

terview sounded as though he had broken almost completely with elijah and was pushing a brotherhood movement. am convinced that a year from now he will be a big, good leader in the movement, in the north. he would have to overcome his religion ever to make any sense to the southern negro.



Freedom Now, McComb is under siege: 13 ministers from the National Council of Churches are here to solve our problems. Though they are a nice group they tend to be naive, talk about setting up some meaningful liaison between us and the white community, about complaints to Chief of Police Guy about harassment, insults, beatings, about talking with the Chamber of Commerce about Negro employment, in short, everyone is talking about the applications of northern methods to the McComb problem, about neatening up the appearances of the movement people, spit and polish which runs counter to utility. They are effective in some areas, though. The "cloth" carries weight in the Negro community, because fundamentalist religion seeps from every shack around here, religion which is both an instrument for us, and a great barrier to us. "My God is going to lead us out of this" may be interpreted either as a call to

action or as a reason for non-participation. . . .

How to keep them down on the farm is our biggest problem. The three ladies from McComb who saw our dear President are all talking about leaving here for the north. They are frightened that they will be bombed by some of the employees of our old McComb hometown-boy-made-good who lives about ten miles from here, E.K. Thornhill, Grand Wizard of the Federated Klans of America. Everyone who leaves here weakens our problem-solving apparatus, because migration is no solution to the situation which stays behind.

All this sounds simplistic in some way. The only way one can tell what is happening is to see the fear, to meet a Negro in the middle of the road with a shotgun over his shoulder, to stand in the police station and hear them ask you if you are queer or something for sleeping in the same house with a nigger, to see how deeply ingrained the man-hero image is into the pot bellied, swaggering sheriff, how the whites are really sick with fear.

much love to both of you. jane, don't take school so seriously.

—jd ☺

## The Art of Daily Activism

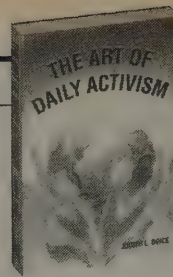
I've been struggling and succeeding and failing at walking my talk with my political and ecological principles since the early seventies, when I first stopped eating meat and started recycling bundles of newspaper. It's been a dizzying spiral trying to live mindfully in a world full of choices and ideas and theories, and my bottom line has always been, if it's more work to do it than feels healthy, if it starts to make me feel crazy, then I cop out. But it upsets me that I have to make these compromises; I wish I could go about my life without causing harm to the environment; so I hate books that make me feel worse about the whole thing. There's a point at which anger and rigidity around being "correct" become more environmentally polluting than the pollution itself.

Judith Boice's book is not one of the guilt-provoking dos-and-don'ts breed of environmental literature. This is a guide for the nineties, a sophisticated look at the realities of trying to live with care for the planet and for ourselves. This lively guide to being an earth warrior covers a

lot of territory — from inner work to career decisions to garbage to investments. It's packed with information, useful advice, and stories from the author's travels around the world — a marriage of the practical, political, and spiritual. Boice recommends that instead of thinking of "saving the world," we work to create a world we want to live in. This book brings the roaring, wild, holy life back into our desire to make a world for our children in which clean water and fresh air are a reality, not a distant memory. —Lara Owen

• **Howl.** Crack peanuts in movie theaters. Go barefoot earlier in the spring. Eat more ice cream. Live. Experience. Suck the marrow of the world. Enjoy. These are the ten commandments:

1. Thou shall love the world.
2. Thou shall love thyself. Thou shall love. Period.
3. Thou shall enjoy.
4. Thou shall follow thy bliss.
5. Thou shall refuse to do anything else.
6. Thou shall make love with thy fellow



### The Art of Daily Activism

Judith L. Boice, 1992; 230 pp.

**\$13.95** (\$14.95 postpaid) from Wingbow Press, 7900 Edgewater Drive, Oakland, CA 94621; 510/632-4700 (or Whole Earth Access)

human beings.

7. Thou shall respect all of Creation.
8. Thou shall speak thy Truth.
9. Thou shall live thy Knowing.
10. Thou shall celebrate with gratitude 'til the end of thy days.

So get on with it. Get holy and roll in the grass and kiss a dog. This is serious business, and you'd better get down to it (or up to it, depending on whether you are facing up or down in your somersault.) Saving the world is heavy stuff. Chuck it. Get on with creating the world you want to live in. Who wants to repair the same old wreck? Recycle it. Build a new model.

## War Tax Resistance

About half of your income tax goes to support the military, past and present. About 80 percent of the national debt is attributable to the military. For moral reasons or just plain outrage at expensive toilet seats and bombers that don't fly, there is cause for both liberal and conservative to decry the spending of such huge sums on killing when there are so many more pressing needs.

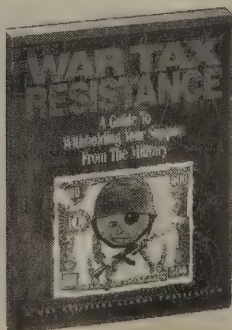
What can you do about this matter? Can

### War Tax Resistance

(A Guide to Withholding Your Support From the Military)

Ed Hedemann, 1992; 131 pp.

**\$14.95** (\$17.95 postpaid) from New Society Publishers, 4527 Springfield Avenue, Philadelphia, PA 19143; 800/333-9093



you refuse to support the military by paying only half your taxes? If you do that, what will happen next? Are there ways to avoid paying for the military and stay out of trouble? (Yes.) This book, now in its fourth edition since 1981, presents the tax resistance arguments, the rules of the game, your options for personal action, and the probable results. Maddening, tantalizing and realistic. —J. Baldwin

■ In 1972 the FBI called [Presbyterian minister Maurice] McCrackin to talk about money they said he owed. He told them it would be a waste of their time because he wouldn't discuss it. A few days later a subpoena from the Justice Department was served ordering him to come in and pay the fine, but saying nothing about unpaid taxes. He didn't appear and never heard from them again.

### • Criminal Court and Jail

It is very rare that the IRS will use the courts and the threat of jail to force payment or punish a war tax resister. A classified IRS directive handed down on July 15, 1980, told its agents not to pursue felony pros-

ecution of tax refusers for fraud or failure to file unless underpayments average at least \$2,500 a year for three years straight.

April 20, 1971

To the Editor of the Boston Globe:

For thirty years, as religious pacifists and advocates of the way of love and nonviolence in all human relationships, my husband and I have been active in the search for peace. It is, therefore, with special dismay that we watch the increase in lawlessness and violence in the country in recent months.

A particular case in point has been brought to our attention recently by a group that claims to be "in the business of peace." We have received a number of appeals, or more realistically demands, for funds in support of the group's program despite our repeated response in the negative. The demands come from a small town in Massachusetts, but we have reason to believe that the organization has much larger ramifications in Washington. It has been suggested, furthermore, that this group is involved in various illegal and violent activities, including the use of both bombs and willful arson as well as outright murder of innocent people. It is said that this group advocates forceful overthrow of governments and coercion or overt repression of those who disapprove of its activities.

It is evidence of this repressive behavior that we are anxious to bring to public attention. In the last few weeks we have received notes that read like ultimatums from these people asserting that if we are not willing to contribute to their program voluntarily, they will take steps to help themselves to our funds or our personal possessions.

We would like to know whether other readers of The Globe have had this experience, and what they have done to stop this outrage. The group refers to itself as "IRS."

Elizabeth Boardman

## Sabotage in the American Workplace

In this collection of confessionals, editor Martin Sprouse reveals some surprising and disturbing truths about the American work ethic and our common perception of it. Anonymous stories of sabotage and revenge — mostly exacted by abused, bored, underpaid, and sometimes endangered workers — make the quote from George Bush in the frontispiece a real eyebrow-raiser: "The American worker is the most productive in the world." That's what George would like us (and the world) to believe; but this survey of store clerks, roofers, bankers, mail carriers, messengers, accountants, and other blue- and white-collar workers belies that ideal.

Some stories are merely entertaining (jamming machinery to create a relaxing stretch of downtime seems to be a popular prank), while others are fairly shocking (a waitress serves spoiled food to ruin her employer's business). Motivation ranges from altruism to simple revenge to explorations in power plays. Instead of looking at sabotage as a problem in the workplace, the book examines the action as a defensive move against the empty and unrewarding jobs most Americans are forced to take — usually in an environment devoid of creativity, honesty and

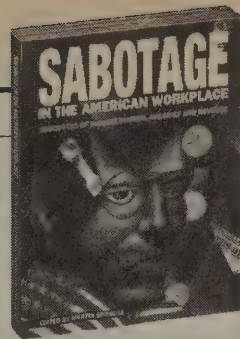
just reward. The workplace generally is the problem; of course, it's also the solution.

—Lorry Fleming

• **Mailroom Clerk** [Heritage Foundation] I got the job right after high school. I had never heard of the organization, and just found the job through the newspaper. When I was working there, I would occasionally glance at what they were putting out; the more I read, the more I thought about it and realized they were doing fucked-up things, like defending business practices in South Africa and U.S. investments there.

They have a big fundraising deal, and when they sent out fundraising requests, people would mail in checks. Sometimes they'd be huge amounts, and sometimes they were piddling. Checks came in from individuals as well as companies. So I'd randomly take an envelop, open it, see how much it was for, and throw it in the shredder. I started doing it more and more. I could tell if it was a check by holding it to the light. If so, I'd toss it, dump it or shred it.

■ **Technical Writer** — Dexter I'm a generalist, a person with diverse interests which multiply daily. Left alone and well-financed, I would produce voluminous



### Sabotage in the American Workplace

(Anecdotes of Dissatisfaction, Mischief and Revenge)

Martin Sprouse, Editor. 1992; 175 pp.

**\$12** postpaid from Pressure Drop Press, P. O. Box 460754, San Francisco, CA 94146; 415/821-4592

amounts of creative stuff in a variety of media. But alas, society doesn't cater to such capricious and irresponsible thinkers. So I circumvent society's shortcomings, and still pay the bills, by doing my techno-artistic projects at work, on company time. In the last four years, I have written a novella, a workbook for a major publishing company's science textbook, two travel narratives, and countless smaller things. I have explored computer music, art, and animation at work and have even written a computer game. I have spent at least a couple thousand hours of company time on my projects, and at a pretty good salary.

## The Overworked American

Are Americans working more and enjoying the fruits of their labor less? Economist Juliet Schor's statistical survey convinced me that we are indeed working more (the average paid work year increased by 163 hours between 1969 and 1987). But more importantly, Schor refutes the entrenched view of neoclassical economists that the length of the work week is chosen by workers rather than employers, buttressing her own view by making a compelling case for increasing satisfaction through working less.

In the latter part of *The Overworked American*, Schor offers some suggestions for how individuals and institutions can counteract the structural bias toward longer work hours — and in the process recover time for unpaid but essential activities such as caregiving, community action, and even relaxation and reflection. —Keith Jordan

■ Some shorter-hour schedules can actually raise productivity. For example, many people are more productive on Monday, the first day of the week. By creating two "Mondays," job sharing boosts productivity. But most surprising is the evidence that under certain conditions a shorter workday

will not necessarily reduce output and can even raise it. When the Kellogg company made their historic switch to a six-hour day on 1 December 1930, they were searching for a strategy to cope with the unemployment of the Depression. To their surprise, they found that workers were more productive, on the order of 3 percent to 4 percent. In some departments, the pace had picked up even more. According to one observer, "eighty-three cases of shredded whole wheat biscuit used to be packed in an hour (under the eight-hour day). At the time of my visit, the number was 96." The workers were pleased, preferring the quicker pace but shorter hours. And management was pleased as well. According to W. K. Kellogg, "the efficiency and morale of our employees is [sic] so increased, the accident and insurance rates are so improved, and the unit cost of production is so lowered that we can afford to pay as much for six hours as we formerly paid for eight."

■ Consider what has actually happened to the employment rent in places like Kellogg, Medtronic, and Ideal. Each company reduced hours without reducing pay. Therefore the hourly wage went up, thereby maintaining the original employment rent. That's why productivity didn't fall. In cases where workers are paid by the hour,



### The Overworked American

(The Unexpected Decline of Leisure)

Juliet B. Schor, 1991 (Basic Books); 247 pp.

**\$21** (\$23.75 postpaid) from HarperCollins Publishers/Direct Mail, P. O. Box 588, Dunmore, PA 18512; 800/331-3761 (or Whole Earth Access)

where the company raises the hourly wage, and where the changes are incremental (on the order of one to two hours a day), a shorter workday has been shown to pay for itself.

The changes also improved morale. Workers appreciated the company's willingness to schedule fewer hours and raise pay. As a result they conducted more personal business on their own time and showed up for work more regularly. If a workplace reform is done right, a company can gain loyalty and productivity from its employees at no cost.

*"The mind likes strange ideas as little as the body likes a strange protein and resists it with similar energy. . . .*

*[A] new idea is the most quickly acting antigen known to science. If we watch ourselves honestly, we shall find that we have begun to argue against a new idea even before it has been completely stated."*

—Wilfred Trotter

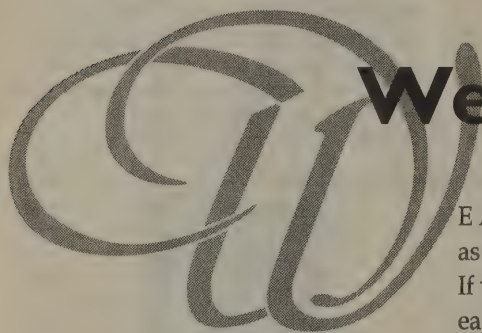
(quoted by Arthur Koestler, *The Act of Creation*)

*"Miniaturization has turned out to be about power; small is not so much beautiful as pre-eminently dangerous."*

—Donna Haraway, *A Cyborg Manifesto*



Scientific American



## We Are Nanotechnology

WE ARE FAST APPROACHING A DRAMATIC PHASE-space transition, as dramatic as the transition from a reducing to an oxidizing atmosphere. If we are insufficiently flexible, if we are too brittle, we will break, our lineage will come to an end, and we will join the legions of the extinct.

BY BC CRANDALL

*BC Crandall, cofounder and vice president of Prime Arithmetics, Inc., a California-based software company, is currently editing *Nanotechnology and the Culture of Abundance* (MIT Press, 1993) and writing *Technological Epistemology: Instrumental Realism in an Era of Molecular Machines*. He is available to speak on nanotechnology, and can be reached at *Molecular Realities*, P. O. Box 1812, Mill Valley, CA 94942, or: [bcc@well.sf.ca.us](mailto:bcc@well.sf.ca.us)*

*The basic concepts of nanotechnology were addressed in WER #54 and #67. —J. Baldwin*

The idea that evolving human technological capability is inexorably leading towards the complete and utter transformation of all molecular systems on and off this planet is an extremely powerful antigen — and catalyst. Nanotechnology's full potential is very difficult to imagine, simply because the building blocks used — individual atoms — are so outrageously small. One ramp to understanding comes from our own molecular, mechanical information-storage system: DNA. The double helix coiled within almost every human cell is 2.3 nanometers (billionths of a meter) wide but nearly 10 meters long. Molecular nanotechnology aims to create devices with the precision of DNA but with much greater power.

Central to the power of nanotechnol-

ogy is the concept of the "assembler." Assemblers are molecular machines with about the complexity of a backhoe, controlled by a PC, or a factory robot and its computerized control system. Assemblers move their arms, grabbing useful atoms and simple molecules from a surrounding soup, then hold these atoms next to each other (for a few millionths of a second) until a chemical bond forms. Atom by atom, assemblers construct whatever they're programmed to create — including more assemblers. It's this potential for exponential growth (2, 4, 8 . . . 16 billion) that makes nanotechnology a *manufacturing* technology and not simply a laboratory phenomenon. Assemblers have yet to be built, let alone completely designed, but no known technological



**(Opposite)** Gripping the wide groove of DNA, a leucine zipper physically delimits the information to be translated from DNA to RNA to protein. Hundreds of such molecular mechanical systems coordinate the material construction of your molecular self.

**(Right)** Caught by an experimental, micro-machined robot hand, a single-cell euglena awaits release. Human micro-technological prowess, driven by the needs of the computer industry, is well advanced and is naturally evolving toward nanotechnology.



barrier stands in the way. And when they are built, it will change the face of manufacturing, health care, and indeed all life on and off the planet.

Obviously, nanotechnology brings up several difficulties, but the first challenge — managing the technology itself — is relatively easy. Straightforward techniques are available for dealing with the dangers of unintended runaway growth (“grey goo”). Tightly controlled operating conditions can severely restrict the “life” of an assembler. Assemblers can be designed to initiate a self-destruct sequence after a certain number of clock cycles — unless a special signal is received. Uncontrolled “evolution” can be nipped in the bud by encrypting an assembler’s instruction set. If one bit flips, the instructions are unreadable, and the assembler ceases to operate.

### Beyond the Purely Technological

More unsettling are the destructive and transformative applications. This Pandora’s box contains at least three serious challenges. First of all there are the militaristic applications.

Before this technology arrives, we’d better have some global agreements in place or we’re in for some serious nastiness. In the next few decades, a nanotechnology research and development lab will be within the means of many groups who feel that their need to impose particular values (memes) on others warrants the violent abrogation of life and freedom. Their options are frightening, including diamondoid tanks, designer viruses, and unimaginably thorough surveillance. Despite the inherent dangers, supporting and directing the development of nanotechnology seems the only viable course of action.

The following logic appears inescapable:

1. Nanotechnology is coming and is potentially dangerous.
2. Successfully suppressing public development will merely shift all efforts into unaccountable military labs.
3. Immense success in suppressing development even in the military sectors of the United States, Eu-

rope, and Japan will only drive development into even less accountable regions of the planet.

But if we imagine that we can confront and solve this problem through communication and mutual agreements (or whatever else it takes), a second cultural challenge awaits. Nanotechnology will massively reorganize the production of goods and services. Nanotechnology is not simply another bit of weird post-modern extravagance; it is the industrial revolution — raised several orders of magnitude and running at fast-forward. In an even mildly competitive market economy, the steep cycle of falling costs brought on by the assembler revolution will transform the existing industrial infrastructure. The design or “programming” of an artifact will constitute 99 percent of its real cost. If products use solar energy as fuel, dirt for raw materials, and can double their bulk through self-replication in a few days, what won’t be cheap?

Culturally, we are in a preconscious phase regarding nanotechnology — it sounds too unbelievable — but this is changing. With the arrival of the field’s first thorough technical presentation, *Nanosystems: Molecular Machinery, Manufacturing, and Computation* (Drexler, 1992) and the publication of the proceedings from the first two international conferences on nanotechnology, the field will take a leap in credibility. Universities have announced courses based on Drexler’s text. Various industries are just beginning to realize what is coming and are scrambling for understanding and position.

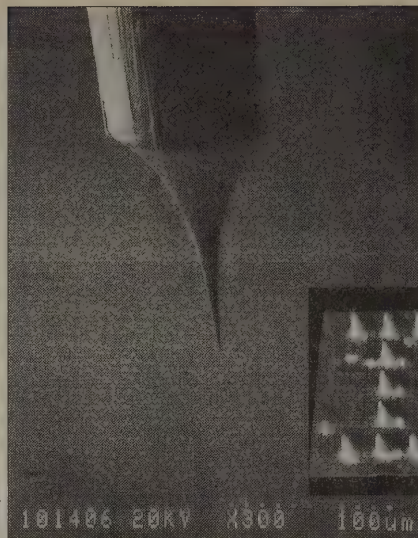
IBM, the \$70-billion-a-year behemoth, has already entered the field. J. A. Armstrong, IBM’s Vice President for Science and Technology and Chief Scientist, states that “nanoscience and nanotechnology will be central to the next epoch of the information age, and will be as revolutionary as science and technology at the micron scale have been since the early seventies. . . . Indeed, we will have the abil-

ity to make electronic and mechanical devices atom-by-atom when that is appropriate to the job at hand" (Armstrong, 1991). In Japan, the Ministry of International Trade and Industry (MITI) and the Science and Technology Agency (STA) are both launching multiyear, multimillion-dollar research efforts to develop systems and mechanism "at the level of atoms and molecules with scanning tunneling microscopes, atomic force microscopes, and other devices for working at the nanometer level" (*Nature*, 9 May 1991).

### Memetic Evolution in the Fast Lane

Perhaps the most difficult challenge nanotechnology presents is the need to face our understanding of who or what "we" are. Mature nanotechnology will allow the creation of systems no larger than a white blood cell (five microns), capable of generating the processing power of a human brain (10 teraops). Mapping the intricate brocade of a human mind onto such a machine with anything approaching satisfactory resolution will not be easy, but the creation of "artificial" or machine intelligence is likely to provide an accessible challenge (Moravec, 1988). Perhaps a device with full Turing-test interactivity capable of satisfying our desire for an equal Other — weaving sufficiently dense layers of memory around a shifting model of existential reality, and suffused with a matrix of desire — would need to be the size of the head of a medieval pin.

The consequences of an accelerating technology are difficult to contemplate. Barely domesticated primates, bewildered by generations of mind-numbing proscription, judeo-christianic "reality constructs" filled with comfort lies of a world beyond, blinded by the escalating glare of technical proficiency and industrial advancement, and reeling with disgust and nausea at the technocorporate nightmare of managed genocide and the pushbutton holocausts



Nanospace

Working at a few degrees above absolute zero, researchers at IBM used a scanning tunneling microscope (STM) — the tip of which is shown at left — to manipulate 35 xenon atoms on the surface of a nickel crystal to create their favorite logo.

of Nazi Germany and the nuclear United States, we must now face the unprecedented challenge of molecular engineering. We are called upon to direct not only our own evolution but the life force of an entire planet. Is it any wonder we shirk the moral responsibilities implicit in such a task?

But once accepted (or, more accurately, once a process of acceptance has begun to unfold), the question becomes, at what wellspring of vitality and inspiration can we drink in order to sustain our efforts to inaugurate a world of health, wealth, and delight? Reason alone is demonstrably inadequate.

### Technological Caregiving and Tender Power

Perhaps we need to discover that the role of *Homo sapiens* has been to "incubate" technology on behalf of a microbial world. "A selfish attitude and an exaggerated sense of our own importance may have spurred the augmentation of technology and human population at the expense of other organisms. Yet now, after the 'incubation phase,' the Gaian meaning of technology reveals itself as a human-mediated but not a human phenomenon, whose applications stand to

expand the influence of all life on Earth, not just humanity" (Margulis and Sagan, 1991). If this is the case, an evolving awareness of a new locus of identity may provide us with the strength and wisdom to compassionately direct the scarcely imaginable power of nanotechnology on behalf of all Gaian life.

Given the transformation of consciousness we need to manifest, the fact that we are legally denied access to molecules with the most striking capacity to induce powerful transpersonal and transspecies experiences — in this and other "modern" nation-states — is a tragic symptom of cultural stupidity and denial. Moreover, our compassion and understanding must stretch to include not only other species (other manifestations of DNA's endless desire), but that most alienated Other: technological devices. Healing of this magnitude will require all the tools at our disposal. Technology is not outside nature. We humans must breathe life and passion and tenderness into DNA's newest and most alien material offspring.

Frankenstein's creation was a monster, cobbled together from biological and extra-biological sources — like each of us today — but only in his abandonment did he become terrible

**TECHNOLOGY is not outside nature. We humans must breathe life and passion and tenderness into DNA's newest and most alien material offspring.**

(Winner 1977). We must find and forge personal and political capacities to care for technological entities and evoke in our prosthetic, artifactual extremities compassion, pleasure, and delight. Those of us that find joy in an infant's ear, in erotic encounters, in transformational experiences induced by mind-manifesting molecules, *must* participate in the

(de)construction of ever-new, ever more gentle machinic entities lest mind-shattered individuals continue their reification of a fiery apocalypse.

"[Humanity's] self-alienation has reached such a degree that it can experience its own destruction as an aesthetic pleasure of the first order."

—Walter Benjamin, *Illuminations* 🐣

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## Ishmael

I have been a voracious reader all my life. From now on I will divide the books I have read into two categories — the ones I read before *Ishmael* and those read after. My working hypothesis is that this book is actually a theological work, possibly a new book of the Bible. A third testament is due about now anyway. For some reason it has been superficially structured as a novel. The author is probably a holy man, possibly a saint.

*Ishmael* won the \$500,000 Turner Tomorrow Award for fiction "that produces creative and positive solutions to global problems." It is a comprehensive and devastating analysis of "civilized" man framed as a Socratic dialog between a man and a gorilla. Reviewers seem to have nothing to compare it to. It could easily be categorized as mythology, anthropology, or theology.

After humans go extinct, civilizations that follow us will (I hope) have books with chapters about us. I have the eerie feeling that *Ishmael* might be an excerpt from a book like that. —Jim Britell

• "The law you're looking for has been obeyed invariably in the living community for three billion years." He nodded to the world outside. "And this is how things came to be this way. If this law had not been obeyed from the beginning and in each generation thereafter, the seas would be life-

less deserts and the land would still be dust blowing in the wind. All the countless forms of life that you see here came into being following this law, and following this law, man too came into being. And only once in all the history of this planet has any species tried to live in defiance of this law — and it wasn't an entire species, it was only one people, those I've named Takers. Ten thousand years ago, this one people said, 'No more. Man was not meant to be bound by this law,' and they began to live in a way that flouts the law at every point. Every single thing that is prohibited under the law they incorporated into their civilization as a fundamental policy. And now, after five hundred generations, they are about to pay the penalty that any other species would pay for living contrary to this law."

Ishmael turned over a hand. "That should be guide enough for you."

• "You mean the people of your culture will not accept what you've learned here."

"That's right."

"Let's be clear about what they will and will not accept. The law itself is beyond argu-

## Ishmael

Daniel Quinn, 1992 (Bantam); 266 pp. **\$20** (\$22.50 postpaid) from Bantam, Doubleday, Dell/Fulfillment Dept., 2451 S. Wolf Road, Des Plaines, IL 60018; 800/223-6834 (or Whole Earth Access)

ment. It's there, plainly in place in the community of life. What the Takers will deny is that it applies to mankind."

"That's right."

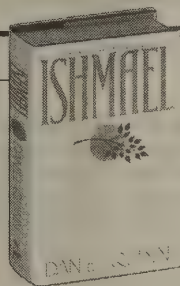
"That hardly comes as a surprise. Mother Culture could accept the fact that mankind's home is not the center of the universe. She could accept the fact that man evolved from the common slime. But she will never accept the fact that man is not exempt from the peace-keeping law of the community of life. To accept that would finish her off."

"So what are you saying? That it's hopeless?"

"Not at all. Obviously Mother Culture *must* be finished off if you're going to survive, and that's something the people of your culture can do. She has no existence outside your minds. Once you stop listening to her, she ceases to exist."

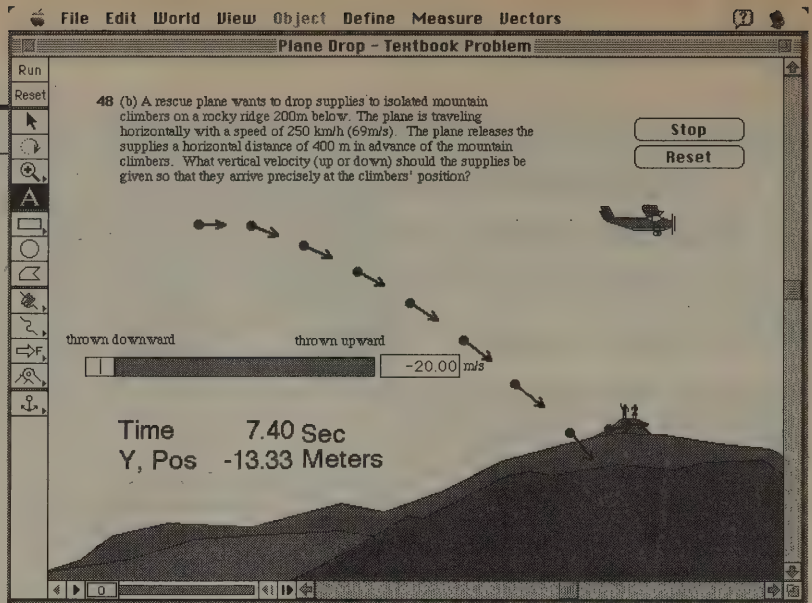
"True. But I don't think people will let that happen."

Ishmael shrugged. "Then the law will do it for them."



## Interactive Physics II

This software is the Newtonian Mechanics part of a physics lab without all those expensive, too-small gadgets being manipulated too fast for you to understand, by a professor standing too far away. The program brings textbook diagrams to animated life. You can mess around with vectors, springs, pulleys, levers, momentum, car wrecks, and astronomy, changing values at will just to see what will happen. You can even turn off gravity to see how far and with what trajectory your thrown moonrock will fly. You can control experiments by drawing or with formulas, or both. The program is powerful enough to be engrossing. It is especially good at developing a feel for the principles under examination. But it's not quite as easy as the introduction's promise that teachers "can immediately use [the program]." It has a fat, competent instruction book that must be understood by teacher and student — even the Mac-hip — in order to reap the benefits.



A simpler, cheaper version called *Fun Physics* is also available. —J. Baldwin

### Interactive Physics II

Requires Macintosh System 6.0.5 or greater, 2 MB RAM (2.5 MB RAM for System 7)

**\$399** (\$406 postpaid)

### Fun Physics

Requires Mac System 6.0 or greater, 1 MB RAM; System 7-compatible

**\$99** (\$106 postpaid)

Both from Knowledge Revolution, 15 Brush Place, San Francisco, CA 94103; 800/766-6615

## Explorabook

This truly is a museum in a book — or at least some tasty bites from one of the best museums around, San Francisco's Exploratorium.

Among the things built right into this spiralbound book are a full-page Fresnel lens, two packs of agar (for growing cultures of bacteria) and both a one-way mirror and a diffraction grating. There's even a fairly powerful magnet in a wand that comes attached to the binding. All these items are used in the more than fifty activities described and wittily explored within.

My seven-year-old son Nate spent a whole weekend with this book when he first got his hands on it. He especially liked the optical illusions — an Exploratorium specialty — and the opportunity to grow a culture of his own mouth bacteria.

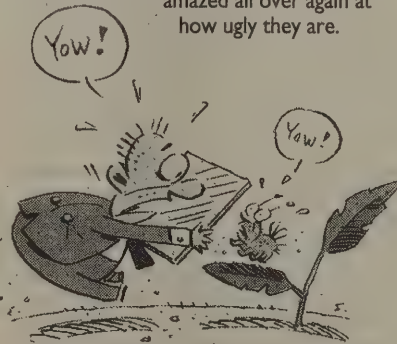
One thing I've always liked about the Exploratorium is its conviction that nothing is learned until it is self-taught — and the more hands-on the learning, the better. It's fitting that they have created one of the most hands-on books around. — Keith Jordan

### • What Is It?

In three words or less? A light bender. It's a Fresnel lens (pronounced "fray-nel"). A sheet of plastic that has been manufactured with very precise bumps cut into it. The result? A magnifying lens of about four power.

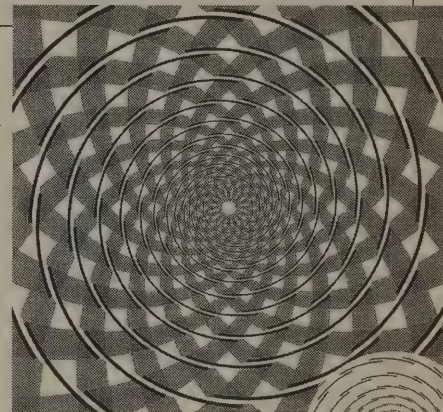
### How Can I Play With It?

Go out and find some little tiny things to look at. For starters, I'd suggest bugs; they're close at hand, they're always willing and, when you see them up close, you'll be amazed all over again at how ugly they are.



### • How to Use the Explorabook

First of all, please do not simply read this book. If you own the Explorabook for more than a few hours, and do not bend or smear any of its pages, nor tear open the agar packets, nor attempt to lose the attached magnet, then you are probably not using it correctly. It is a tool. Please treat it that way.



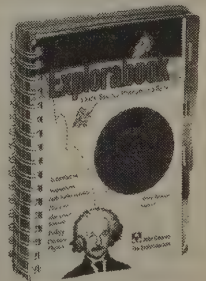
Perhaps the most enduring of all the printed optical illusions, Fraser's spiral refuses to "correct" itself even after you understand the illusion. Much as your brain wants to deny it, the "spiral" is not a spiral, but in fact concentric circles, as the inset shows.

### Explorabook

(A Kids' Science Museum in a Book)

John Cassidy and the Exploratorium Staff, 1991 (Klutz Press); 100 pp.

**\$17.95** (\$21.95 postpaid) from The Exploratorium Store/ Mail Order Dept., 3601 Lyon Street, San Francisco, CA 94123; 800/359-9899 (or Whole Earth Access)



## Surreal Numbers

I first saw this book in a freshman seminar in college and it's still one of my favorite textbooks (if you can classify it as one). It is a math book, but it is one of the most unique mathbooks I've seen. It is not definition . . . theorem . . . definition . . . incomprehensible example, then bunches of dreary problems. The author calls it a novelette; I call it a wonderful, fanciful look into the creative process of math. Most people never find out that math and arithmetic are not the same thing. This book is a great example of what happens in advanced mathematics.

You need a basic understanding of numbers and sets, a bit of patience with mathematical notation, and a sense of fun. Then grab your pencil and follow along. You may even learn to enjoy math. —Linnea Johnson

And Conway said, "Let the numbers be added to each other in this wise: The left set of the sum of two numbers shall be the sums of all left parts of each number with the other; and in like manner the right set shall be from the right parts, each accord-

ing to his kind." Conway proved that every number plus zero is unchanged, and he saw that addition was good. And the evening and the morning were the third day.

A. Well, that's kind of interesting. I was wondering what would happen if we defined addition like this:

$$x \oplus y = (X_L \oplus Y_L, X_R \oplus Y_R).$$

I called this  $\oplus$  because it wasn't obviously going to come out the same as  $+$ . But it was pretty easy to see that  $\oplus$  was a commutative and associative operation, so I wanted to see what it turned out to be.

B. I see; the sum of  $x$  and  $y$  lies between  $X_L + Y_L$  and  $X_R + Y_R$ , so this definition might turn out to be simpler than Conway's.

A. But my hopes were soon dashed, when I discovered that

$$0 \oplus x = 0$$

for all  $x$ .

B. Ouch! Maybe  $\oplus$  means multiplication?

B. From now on whenever I read a math book, I'm going to try to figure out by myself how everything was done, before look-

ing at the solution. Even if I don't figure it out, I think I'll be able to see the beauty of a proof then.

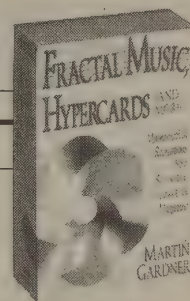
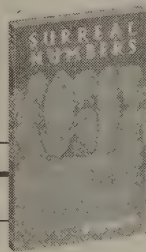
A. And I think we should also try to guess what theorems are coming up; or at least, to figure out how and why anybody would try to prove such theorems in the first place. We should imagine ourselves in the discoverer's place. The creative part is really more interesting than the deductive part. Instead of concentrating just on finding good answers to questions, it's more important to learn how to find good questions!

B. You've got something there. I wish our teachers would give us problems like, "Find something interesting about  $x$ ," instead of "Prove  $x$ ."

## Surreal Numbers

Donald E. Knuth, 1974; 119 pp.

**\$16.95** (\$18.45 postpaid) from Addison-Wesley Publishing Co./Order Dept., One Jacob Way, Reading, MA 01867; 800/447-2226 (or Whole Earth Access)



## Fractal Music, Hypercards and More . . .

People who claim that math is never fun haven't read anything by Martin Gardner. He was the "Mathematical Games" columnist for *Scientific American* for years; *Fractal Music* is his latest (the fourteenth!) collection of those columns. Even longtime fans of his will find some new things in this book. He has included addendums for each column to update and add information, bibliographies for the reader interested in learning more, and two new chapters written especially for this collection.

For those who have never read a word of his, there is a lot to marvel over. He covers everything from modern art and music to magicians and mathematical zoos. There are puzzles, games and problems with answers at the end, as well as unsolved problems in the field for everyone to ponder. There is definitely some serious mathematics in this book, but even the most complex chapters can be enjoyed by people without advanced degrees in math (as long as you're willing to take some of his statements on faith). I was entertained and made to think; to my mind that makes it good reading. —Linnea Johnson

Investigating the properties of Egyptian fractions is now a small but challenging task in

number theory. There are many deep unsolved problems in this area, but there are also many problems well within the reach of any clever novice that have much in common with certain recreational puzzles. For example, consider the old Arabian brain-teaser about a man whose will specified that his 11 horses be divided so that his eldest son would get 1/2, his middle son would get 1/4 and his youngest son would get 1/6. When he died, his lawyers were puzzled about how to carry out these eccentric instructions. After all, horses are of little value when sliced into fractional parts. A relative, hearing of the problem, solved it by lending the heirs his own horse. The 12 animals were then easily divided according to the formula in the will, with the three sons respectively getting six, three and two. One horse was then left over, and so the relative got his horse back!

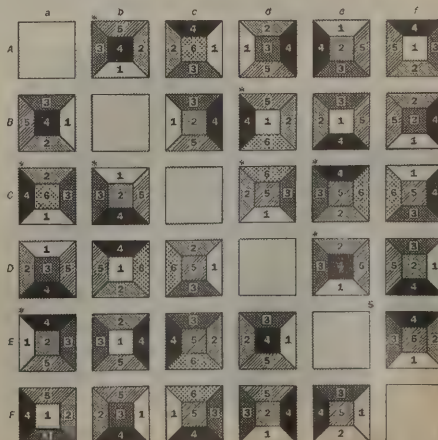
The historic 30-cube puzzle is stated as follows: Select any cube at random and call it the prototype. The task is to find eight cubes among the remaining 29 that will build a two-by-two-by-two model of the prototype. The model must have solid-color faces (each face made up of four cube faces) that correspond to the arrangement of colors on the prototype. Furthermore, the model must meet what we shall call the domino condition. Every pair of touching faces in the interior of the model must be of like

## Fractal Music, Hypercards and More . . .

Martin Gardner, 1991; 327 pp.

**\$13.95** (\$16.95 postpaid) from W. H. Freeman and Co., 4419 W. 1980 S., Salt Lake City, UT 84104; 800/488-5233 (or Whole Earth Access)

color, that is, a red face must abut a red face, a green must abut a green and so on. It turns out that for each prototype there is only one set of eight cubes that will fulfill these requirements, but the cubes will always build the model in two distinct ways.



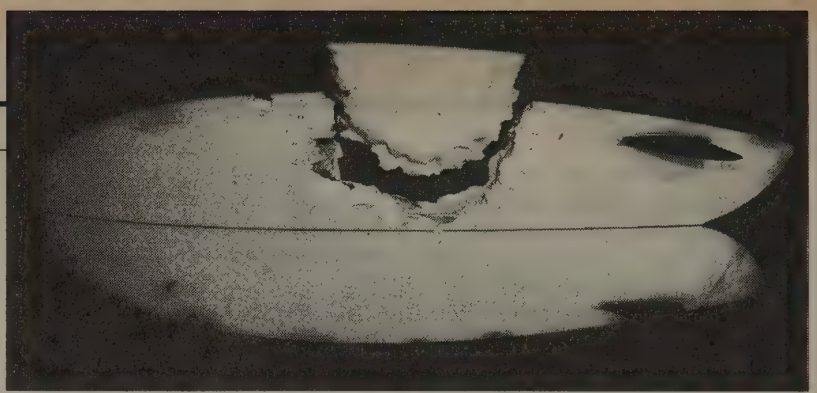
John Horton Conway's matrix for the 30 color cubes.

## Great White Shark

Among people who spend time on or in our oceans, sharks evoke emotions that range from fascination to hatred; none more so than *Carcharodon carcharias*, the great white. Since the *Jaws* movies, they have almost become a cottage industry in television nature programming.

Richard Ellis, author of *The Book of Sharks* (EWEC p. 41), John McCosker, director of Steinhart Aquarium at the California Academy of Sciences, and legendary underwater photographer Al Giddings have given us our most complete look at great whites to date. While they don't minimize the dangers of an encounter in the wild — these sharks will eat most anything that they can find, including people — they make a compelling case for the conservation of this magnificent predator. If we lose the great white to extinction, it will have been destroyed not by competition, habitat destruction or "manifest destiny," but by our own prejudice and fear. —David Burnor

The fact that so many white shark victims were not consumed had been a great mystery. It had become part of the popular mythology that the white shark was a man-biter, not a maneater, despite the diverse diet of the species. Others have suggested



Lewis Boren's surfboard. When Boren's body was recovered, it bore similar bite marks.

that our species is distasteful, perhaps because of the sun lotion or neoprene wet suits we occasionally cover ourselves with.

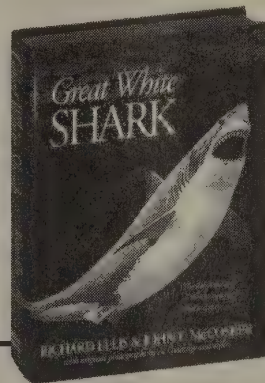
Like so many discoveries, what had been nonsense became sense in an instant. In this case I was at sea, returning to San Francisco on a bumpy boat ride from the Farallon Islands. Perhaps it was the combination of the bumpy ride and the near nausea of a 26-mile voyage, but when I reached

the shore, I realized as if with a whack to the side of my head that it all made sense. Why *should* a shark consume its prey before it has died? A blind or vision-impaired shark would be checkmated, unable to find its next meal. The white shark, I realized, has developed a prudent strategy of bite, spit, and wait — and only then return to consume the prey. In attacks on humans, this provided a much better explanation than any previously advanced theories. But like all hypotheses, it would require testing, and the idea of using human subjects had no appeal.

### Great White Shark

Richard Ellis, John E. McCosker, and Al Giddings, 1991; 270 pp.

**\$50** (\$52.75 postpaid) from Harper-Collins Publishers/Direct Mail, P. O. Box 588, Dunmore, PA 18512; 800/331-3761 (or Whole Earth Access)



## Ocean Frontiers

As we become more aware of how interconnected the health of our ocean environment is with our physical and economic well-being as creatures of the land, it's useful to look to the interdisciplinary efforts of the marine sciences for an understanding of this dynamic relationship.

This book profiles a dozen oceanographic institutions on five continents; their contributions cover pollution control, weather forecasting, fisheries management, shipping, mineral exploitation, and military strategy. *Ocean Frontiers* focuses on their history, current work, and how their basic research in the biological and physical sciences is being applied.

—David Burnor

• "To use the ocean wisely," E. Seibold wrote, "you must first understand it. How to maintain our renewable biological resources? How to conserve the genetic potential of the 180,000 marine species known up to now? How to conserve ecological integrity? What is the ultimate compatibility of the oceans with the many different kinds of pollutants transported from land by rivers and wind? All of these and many more problems need more and better research because at least since Bacon we have learned that 'Nature, to be commanded, must be obeyed'."

• The ocean responds readily to atmospheric conditions at its surface. For example, wind plowing over the sea generates waves on its surface, from ripples less than a centimeter high, to storm-driven waves that can reach more than 15 meters in height. Wind can also reach further down into the ocean, causing motion well below the sea surface affecting the physical structure of the water column, but also influencing the distribution of fish egg masses and the phyto- and zooplankton. Fluctuations in sea level can also be caused by surface wind — in some parts of the world causing wreckage, devastation,

and even deaths because of storm-related "storm surges." Surprisingly, a model of nontropical storms first developed by Norwegian meteorologists in the 1920s continues to be used for storm prediction today — the familiar low and high pressure systems of television and newspaper weather maps finding their origins in that early mathematical depiction. That model, however, describes only the so-called large-scale features of storm systems — thereby missing the myriad of fine detail that constitutes the fronts and precipitation zones.

### Ocean Frontiers

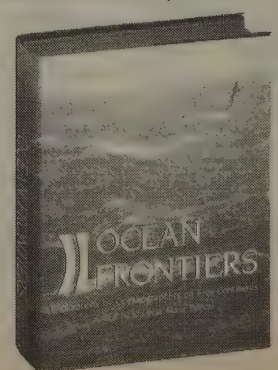
Elisabeth Mann Borgese, Editor. 1992; 288 pp.

**\$49.50** (\$52.50 postpaid) from Harry N. Abrams Inc./Special Sales, 100 Fifth Avenue, New York, NY 10011; 800/345-1359 (or Whole Earth Access)



Krill (*Euphausia superba*) is, by biomass, the most abundant crustacean in the Antarctic. In winter it stays in the pack-ice, while

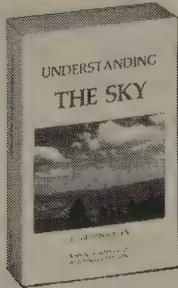
in summer it thrives in the clouds of phytoplankton at the ice edge.



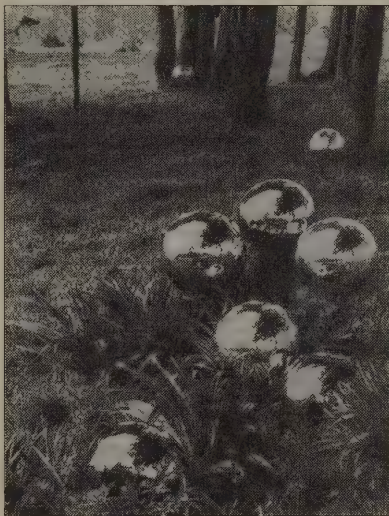
## Understanding the Sky

What's going on up there — a weather book by one of sport aviation's best teachers, who has looked at clouds from both sides.

Whether you're watching from the ground or the air, the sky has plenty of puzzling features. Dennis Pagen has seen and explained more than any other writer I know of. —Hank Roberts



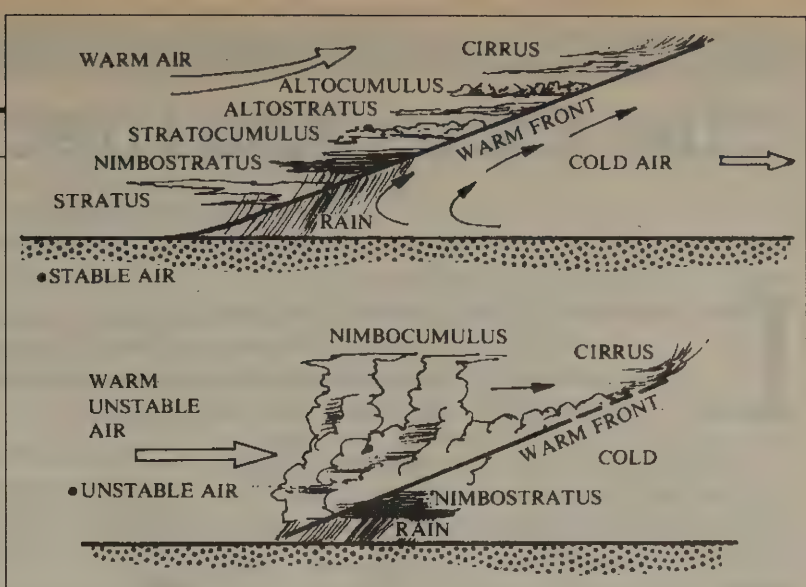
## Gazing Balls



They're called mirror balls or gazing balls. The glass spheres are intended to sit on a low pedestal in the garden, reflecting flowers, sky, sun and the passing scene. Choose a color for the effect you wish (here in the sun-fried CA landscape, gold is especially nice). This is the first time I've seen them for sale west of the original thirteen colonies, and even there, satisfying fat ones like these twelve-inchers are not easy to find. Some folks feel that gazing balls also reflect a taste tending to the pink plastic flamingo; but for about a century now, many folks have regarded them as a rare garden-enhancing treat. Not suitable for neighborhoods infested with BB guns. —J. Baldwin

### Gazing Balls

**\$40** (\$45.50 postpaid) from Wind & Weather, P. O. Box 2320, Mendocino, CA 95460; 800/922-9463



Cross-sectional view of a warm front. The figure shows two types of warm front: those bringing either stable or unstable air. In the first case we should expect long periods

of steady rain and generally smooth conditions except perhaps near the frontal boundary. In the unstable case we should expect bursts of heavy rain intermingling with steady drizzle as well as dangerous turbulence associated with thunderstorms.

## Understanding the Sky

Dennis Pagen, 1992; 280 pp.

**\$19.95** (\$21.85 postpaid) from Sport Aviation Publications, P. O. Box 101, Mingoville, PA 16823

## Orion Telescope Center

It can take nerve to buy a telescope or other major opticware from a store that doesn't specialize in such things; either the staff doesn't know enough to help you make a good decision, or they talk jargon at you as if you were a professional astronomer. No sale. This dedicated "teaching catalog" helps the amateur learn and choose in peace — but only from a few respectable brand names. This comfortably narrows the zillion available choices, but also gives

opportunity for criticism from the inevitable "you shoulda got a \_\_\_\_\_ (one not in this catalog)" experts who materialize out of the night to make you feel bad. Nonetheless, Orion is a good place to start your homework. —J. Baldwin

### Orion Telescope Center

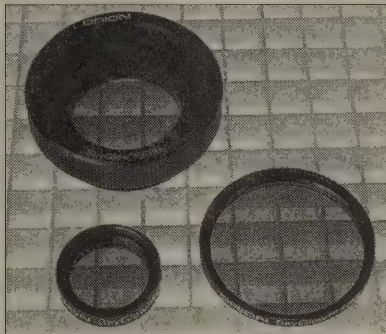
Catalog free from P. O. Box 458, Santa Cruz, CA 95061; 800/447-7001 (in CA: 800/443-1001)

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# The Case Against Patents

BY DON LANCASTER

**L**ET'S START OFF with a seemingly simple quiz — which of the following is the most likely to cause you no end of grief?

- (A) Dealing noontime crack on the front stairs of the Salt Lake City police station.
- (B) Shooting a sequence of kiddie-porn videos in the basement of your favorite church.
- (C) Calling yourself an inventor and behaving like one.

A trick question, of course. Given the normal franchise prepayments and when handled as a class act, (A) and (B) will both have considerable upside potential and a rather well-defined risk-to-reward ratio. (C) is certain to be an absolute and total loss.

Over the years, "they" have defined *inventor* as a mark to be conned. As a sheep to get shorn, gangraped, flayed alive, and finally nailed to the nearest shed.

It is fine to be an *industrial product developer*, run a *prototyping house*, or be a *concept consultant* or an *evaluation specialist*. All of these are acceptable roles in society for which, at least occasionally, you may end up being quite well rewarded. These are also the sorts of things that you, as a midnight engineer, should be striving toward. Upward and onward.

But don't ever refer to yourself as an inventor or act like one, for you are certain to end up done in very badly. Don't ever let anyone even suspect that you are capable of inventing anything.

Those invention-marketing services with the tiny classified ads are not really the main problem. These folks are basically selling dreams and wish fulfillment in much the same way as a vanity publisher or, for that matter, an X-rated movie rental. Since the use of any invention-marketing firm is the guaranteed kiss of death for any new product, these also do serve a useful purpose in helping keep abysmal junk out of the marketplace.

The patent process itself is by far the worst offender in inventor-bashing. If a Las Vegas casino operator had the gross effrontery to offer the same odds the patent office does, he would be tarred, feathered, and run out of town on a rail. If it were not a government bureaucracy, the patent office would long ago have been shut down under the RICO act.

Now, the patent system may or may not still retain some marginal utility in a Fortune 500 context. But, as a small-scale midnight engineer or hardware hacker, any involvement with the patent system in any way, shape, or form is virtually guaranteed to cause you a monumental long-term loss of time, money, and sanity.

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*Don Lancaster is known for his early work with microcomputers and more recent elucidations of Postscript. He's written 26 books and many articles (see WER #67, p. 68, for one). This piece is reprinted from Lancaster's column, "The Blatant Opportunist," in the bimonthly Midnight Engineering (\$19.95/year from 1700 Washington Avenue, Rocky Ford, CO 81067; 719/254-4558). Lancaster offers free technical advice and information on his publications: 602/428-4073. —J. Baldwin*

I'd guess the main problem is the mythology that has built up around the patent process over all the years — a mythology that no longer applies to the midnight engineer or the small-scale startup. Let's try and replace the myths with some cold hard facts.

**Fact — your patent does not in any manner prevent others from stealing or using your ideas.**

Should you patent something, anyone is totally free to market your product, rip off all your ideas, or tell others about your work. And there is nothing immediate you can do to stop this from happening.

All a patent does is give you the right to sue someone in a civil action. At some future date in a ridiculously costly, extremely drawn-out and easily circumvented legal process.

Nobody has ever "won" any patent litigation. The sole purpose of patent fights is to cause more grief and harm to the opposition than you are causing yourself. Almost always, this fails miserably.

**Fact — not one patent in one hundred ever shows any positive cash flow.**

There have been lots of studies done on patent productivity. While most of these cite ratios of several hundred to one or higher, 100:1 is a good and very generous working figure. Thus, your state lottery is usually a vastly better investment than a patent.

**Fact — there is not one patent in one thousand that cannot be invalidated or severely minimized by a sufficiently diligent search for prior art done in sufficiently obscure places.**

Very simply, zillions of people worldwide are inventing things. And they all have pretty much the same tools and technology at their disposal. Almost certainly, you are not first with your idea. All it takes is some provable prior art anywhere, and your patent is patently useless.

**Fact — prior art is not needed to bust any patent.**

All you really have to do is show that the claims would have

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been reasonably obvious to a "practitioner in the field." That's all it takes.

As is often the case, a patent search is made without actually looking at any of the *non-patent* history of the field in the way of key papers, seminars and trade journals. All you have to do is find someone somewhere that says it sure would have been obvious to them.

When (not if) your patent ends up busted, you will also run the risk of a frivolous-litigation lawsuit. Thus, if you have the temerity to try to defend your patent, you could end up being fined thousands of dollars.

**Fact — ideas are usually worthless.**

At one time, way back in the golden age of inventing, ideas were worth as much as a dime a dozen. These days, they are worth less than a dime a bale in ten-bale lots.

An idea becomes useful only when and if it can get converted into some marketable product that in fact ends up solving end-user needs.

If you cannot demonstrate end users getting off on your idea, it has no value. It ain't creative unless it sells.

**Fact — big industry does not buy ideas or patents.**

Change of any kind is anathema to any large Fortune 500 corporation. The only reason a new or improved product is ever released is in response to a clear threat of losing market share. Even then (as was obviously the case with minicomputer manufacturers), a larger corporation may choose to drop the ball completely rather than adapting to any sorely needed change.

Consistently, it is all those garage startups and other smaller companies that introduce innovation and change to the marketplace. Only when those changes are overwhelmingly superior does big business pay attention.

Many larger corporations have a policy of flat-out rejecting any outside invention submission. The reason for this is simple — several millions of dollars of in-house ongoing research and development could be lost should some outside epsilon-minus and his attorney scream "You stole my idea!"

The NIH (Not Invented Here) syndrome is alive and well in most larger firms. It looks bad when the R&D staff gets blown out of the water by some kid in a garage somewhere.

So even if you have an absolutely outstanding new idea with rock-solid patents behind it, most of industry simply could not care less.

**Fact — nobody voluntarily pays any patent royalties.**

Nearly any company would much prefer to give its legal department \$100,000 to bust your patent before they would ever stoop to paying you \$10,000 in royalties. Outside patents are something to be ignored, avoided, worked around, or outright busted in court. But *never* to be honored.

**Fact — you will get ripped off.**

The odds are very much stacked against the midnight-engineer startup from day one. If you are a creative type that designs things, the chances are you got that way in the first place through ignoring people and legal details. So, you *will* have your ideas stolen. You *will* be lied to. You *will* be misled.

The trick here is to recognize the inevitability of this ripoff process and not get too upset when it happens.

Ripoffs come with the territory. So factor them in ahead of time and it won't be nearly as rude a surprise when it happens to you.

So, what are the alternative methods for successfully marketing your ideas and concepts? Based on many years of personal experience and several cubic yards of overflowing third-party patent-victim files, here's what I'd suggest:

First, you *totally* avoid contact with anything even remotely patent-related. In any way, shape or form. Do so religiously.

Second, don't bother creating anything in any field in which you are not eventually certain to become an expert. An expert who is thoroughly familiar with the technical literature, the history of the field, the marketing realities, the insider trade journals, and the mainstream tools and techniques in use. There is no point whatsoever in writing forest-fire simulation software if you have never sharpened a Pulaski. Nor (as sadly happened to yet another victim just this morning) in patenting a "new way to replace inductors" without having read and understood Sallen and Key in their classic 1955 paper.

Third, publish all your key secrets and ideas in a major magazine, leaving out no detail and omitting no insider secrets. This can immediately generate positive cash flow for you, and it safely tucks all your ideas away in the public domain, preventing most others from attempting to patent them. This also exposes your new ideas to the widest possible audience.

Fourth, try to set up some royalty arrangement with a small-to medium-sized firm in a position to market and distribute your invention. A normal royalty payment is typically in the 5-percent range. Now for the tricky part: *they must come to you*; never vice versa. That is why it is super-important to publish your ideas and creations and expose them as widely as possible.

You have one and only one defense against getting ripped off in any royalty setup — the expectation that you will be delivering newer and better stuff in the future. That's all.

Fifth, employ the shotgun technique. There is no way that one single idea or product will hack it. To survive in this game, you'll need hundreds or even thousands of new ideas and concepts working for you on a total-lifetime and total-lifestyle basis. Chances are that one or two genuine winners will pay for all the others lost or stolen.

Finally, be realistic. You don't create things to get filthy rich. You create things because you like to create things and have some compelling desire or need to do so. As long as there are enough nickels to keep going, that is all that should really matter. ☺



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# Interesting Stuff

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## Milwaukee Job Saw

Even the esteemed Milwaukee Sawzall® reciprocating contractor's saw can be too much weight, power, noise and vibration, yet the wide variety of blades available includes one just right for the job. This sturdy handle tightly clasps any blade (Sawzall and most any other), permitting much more delicate work to be done (slowly) by hand. It's big enough for a good grip while wearing gloves, and can be readily affixed to the end of a pole for distant access and other cleverness. Voila, but you'll soon be reminded why power tools are so popular.

—J. Baldwin

## Deburring Tool

It's a swiveled, handled, hard-ened blade that neatly dulls sharp metal when applied scraper-fashion to the threatening edge (the "burr," yes?). This little-known device is especially good at taming the nasty inner rim of fresh-sliced pipe and tubing. —J. Baldwin

## Deburring Tool

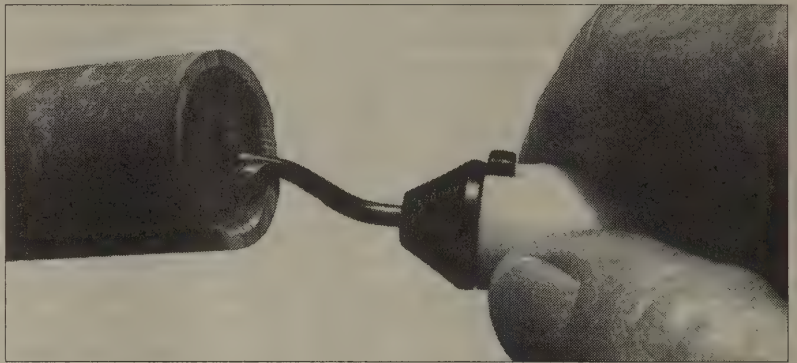
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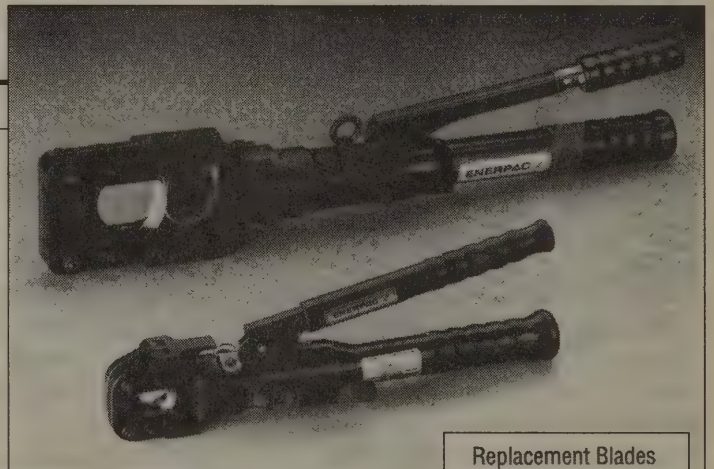


## Enerpac

Enerpac is the trade name for a system offering a selection of hydraulic pumps with matching jacks and things jackish. These well-respected sets are commonly employed by folks such as boat-builders, furnituremakers, and rescue crews for grabbing, gripping, lifting, mashing, push & pull, and whatever else. There's an inspiring variety of sizes and types, all powered by compressed air, electricity, gasoline engines, or you. Think of them as very strong, obedient muscles. Nothing prevents you from using them in your own shop, however modest. At your local industrial hardware and supply, and often at tool rentals.

—J. Baldwin

[Suggested by Tom Ness]



**Self-Contained Hydraulic Cutters.** For wire rope, bar, strand, bolts, cable and chain.

## Enerpac Hydraulic Tools

At local industrial supply houses. Information from Enerpac, 13000 W. Silver Spring Drive, Butler, WI 53007

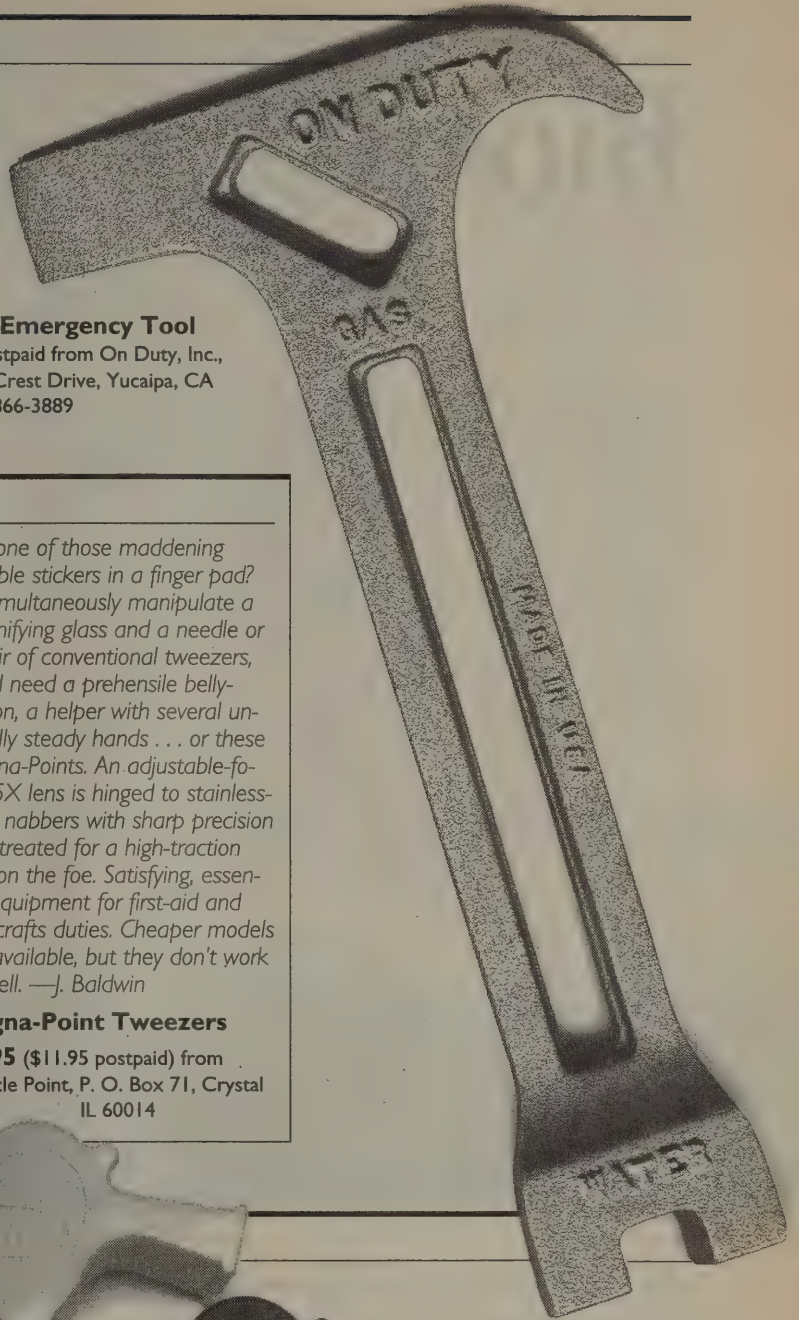
## Replacement Blades

Model No. Blade	Model No. Cutter
WCB-750	WMC-580
WCB-750	WMC-750
WCB-1000	WMC-1000
WCB-1250	WMC-1250
WCB-1580	WMC-1580
WCB-2000	WMC-2000
WCB-3380	WMC-3380

## On Duty Emergency Tool

It's a pry bar, a digging hook, and a shutoff wrench for gas and water valves. It's not a hammer — too lightweight. (If you really need a hammer in an emergency, pick up a piece of the rubble lying around.) The "tough heat-treated alloy" is magnesium-titanium. Two firefighters designed the On Duty as the tool they'd leave at home with their families. Watch for it at True Value hardware stores.  
—Hank Roberts

**On Duty Emergency Tool**  
\$14.95 postpaid from On Duty, Inc.,  
13176 Oak Crest Drive, Yucaipa, CA  
92399; 800/866-3889



## Magna-Point Tweezers

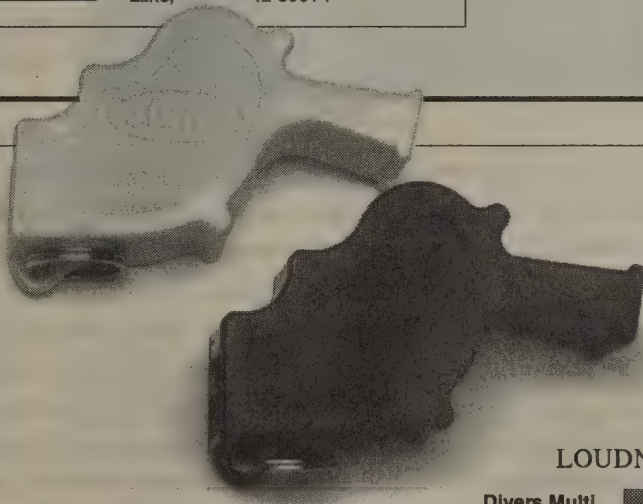


Got one of those maddening invisible stickers in a finger pad? To simultaneously manipulate a magnifying glass and a needle or a pair of conventional tweezers, you'd need a prehensile belly-button, a helper with several unusually steady hands . . . or these Magna-Points. An adjustable-focus 5X lens is hinged to stainless-steel nadders with sharp precision tips, treated for a high-traction grip on the foe. Satisfying, essential equipment for first-aid and fine crafts duties. Cheaper models are available, but they don't work as well. —J. Baldwin

**Magna-Point Tweezers**  
\$9.95 (\$11.95 postpaid) from  
Miracle Point, P. O. Box 71, Crystal  
Lake, IL 60014

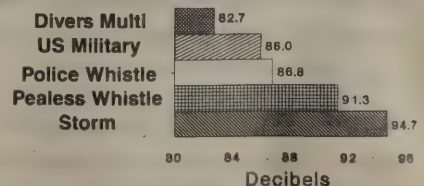
## Storm Whistle

This earsplitter is claimed to be at least twice as loud as other whistles — a modest boast for a sound so fierce and penetrating. In my tests it was able to command attention over a Skilsaw's howl. The unique sound carries well, too. A big air supply isn't required — for better or worse, a small child can easily elicit a shattering squeal. It works in any position, dry, wet, or even underwater. The lumpy shape insists upon the proper grip. Fluorescent colors make it easy to find. Of course there's a lanyard ring. Such competent design is rare. NB: Our otherwise unflappable farm cat did not find the sound acceptable, nor will your hearing if you toot in a small room. —J. Baldwin



**Storm Whistle**  
\$5.95 (\$7.95 postpaid) from All-Weather  
Safety Whistle Co., P. O. Box 8615, St.  
Louis, MO 63126; 314/436-3332 (fax  
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### LOUDNESS TEST\*



\*Test conducted by an independent testing company.

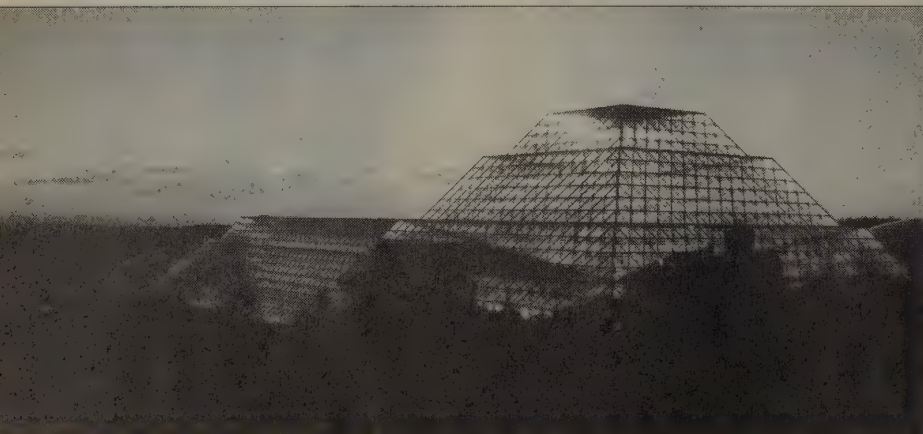
# Biosphere 2 at One

BY KEVIN KELLY

When I reported on the Biosphere 2 project as the cover story for the Summer 1990 WER, the experiment was due to commence that fall. Closure, however, was delayed for twelve months. Then, on September 26, 1991, eight volunteers sealed themselves into a super-airtight greenhouse, along with 3,800 other species of life from six biological regions of the world, for a stay of two years.

Shortly after closure, controversy erupted. The agricultural specialist nicked off the end of her finger in a threshing machine. She was let out through the airlock for surgery, and returned a few hours later with her fingertip back on. But she brought back in a duffel bag of things — among them: additional rolls of film, extra copies of the wilderness planting maps, extra zip-lock plastic bags, two reference books on plant taxonomy, and a spare computer backup board. A few reporters witnessed the duffel-bag addition. When the news was spread to the greater press, the previously uncritical coverage of the project turned nasty. Critics

felt the duffel bag (if not the biospherian's exit and return itself) violated the purity of the sealed closure. Once in a nosy mood, the media turned up a supposedly secret chemical "scrubber" (to balance the atmosphere inside Bio2) even though it had never been a secret. (I was told about it before closure and thought it was a reasonable thing to have.) Old rumors about the company's allegedly cultish origins were revived and elaborated by disgruntled former employees and ex-consultants. To be fair, Space Biosphere Ventures, Bio2's owners, brought on some

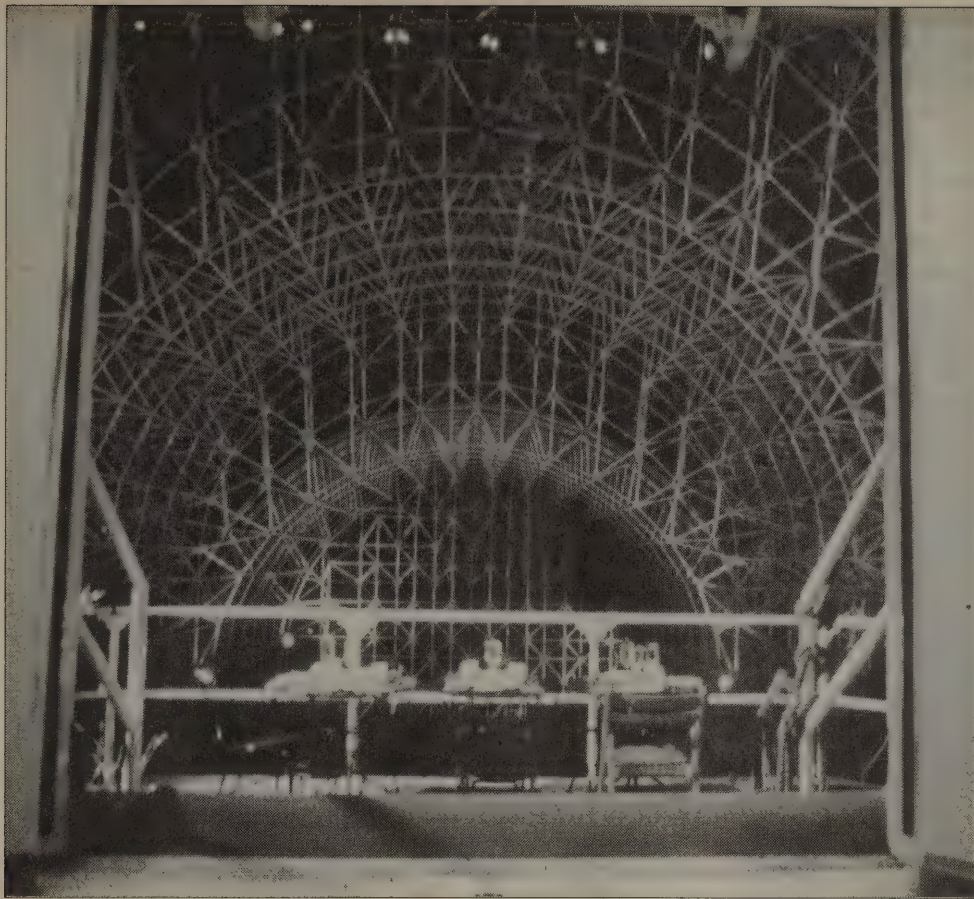


Kevin Kelly

of this negative press by the way they handled public relations, a mistake they have admitted and since remedied. I mention all this because the sensationalist flak has completely obscured the fascinating results flowing from the great ark. There's true "news that stays news" in both the group's scientific experiments and its daily lifestyle.

To ensure the scientific integrity of Bio2, Ed Bass, the primary funder of the project, commissioned an independent panel of prestigious scientists to review Bio2's progress and make recommendations for its scientific future. The committee's report, issued in July, was frank and to the point. Among other things, it recommended quicker publication of data, a better-developed plan of experiments, and the appointment of a separate director of science. The committee also stated that "prudent additions or removals of materials from Biosphere 2 . . . would not in our view compromise the experiment's scientific integrity." In fact, they urged that more material samples be taken from the structure to obtain better data, and that food and supplies be brought in, if needed. The report emphasized the project's great potential for science. I hope to convey that promise in this article.

The maiden voyage of Bio2 has just passed its halfway mark. The following update is my take on what has been learned as Biosphere 2 turns one. I thank the two biospherians quoted extensively here, Linda Leigh and Mark Nelson, for generously taking time to answer my many questions.



In the absence of novelty, celebrations take on greater meaning within the Biosphere. The biospherians began to serve food and consume it with almost ritualistic deliberation. Any excuse for a party — and special food treats — is taken up. One dark winter evening, the crew set up a majestic feast, of exquisitely presented food grown by their own hands, inside the lamplit structure of the ark.

## Update on the eight people sealed in the glass ark

ONE YEAR LATER. The eight biospherians are alive and well. They are skinnier.

One of the crew plummeted from 208 pounds to 156. But he was prepared for this. He brought in clothes several sizes too small at the start. The amount of food the biospherians were able to raise for themselves in the first year has been a nagging problem. Frankly, the biospherians are hungry.

Food crops haven't produced what the biospherians hoped. On the other hand, it is amazing that anyone can live at all on the minuscule fields they are tending inside. The total Bio2 agricultural space to support eight adults is a mere half-acre; that includes the floorspace in the animal "barn." A half-acre works out to be a tennis-

court-size plot for each person. On this tiny portion of land, the biospherians are to grow *all* that they eat, year in and year out. "All the food that fits" is what they get.

The ordinary annoyances that plague summer gardeners take on a life-or-death aspect in Bio2. The squash was infested with powdery mildew, the peas with root fungus, and the potatoes and beans with broad mites. Pests directly reduce how much food you eat at dinner. And you can't spray the beasties with poisons since you'll be drinking the evaporated runoff later in the week. At one point the desperate biospherians crept

down the rows of potato with portable hair dryers to drive the mites off the leaves, without success. They lost five crops, including the bulk of their white potatoes — one key staple. (They have several key staples since they planned on losing a couple.) Pruning the infected foliage and spraying with sulfur and soap is currently keeping some of the pests under control.

During the first spring, the crews harvested on average 60 pounds of fruit and 80 pounds of vegetables per week. That's for eight working adults. Those amounts figure out to be 2.5 pounds, or about a kilo, of fresh produce per person per day; add in about 1.5 pounds per day of grains and starches, and you get 2 kilos (4 pounds) of food per day. Everyone

gets the same amount. Rice is precisely rationed for each serving: 454 grams per person, not a gram more or less. At meals there are no leftovers, ever. Translated into calories, their diet provides the biospherians with 2,000 to 2,100 calories daily. Government guidelines state that adults should eat 2,000 to 2,700, depending on body weight, if they are engaged in *light work*. The first-year Bio2 diet is just enough food to live on, but it won't make you fat. On average, the biospherians have lost 16 percent of their body weight.

Linda Leigh, resident biologist in Bio2, says, "Losing weight for me has been a difficult issue emotionally because for the past ten years or so I have tried to gain weight; losing is a bit scary and also has meant a slight decline in strength — I simply can't do some of the heavier work that I used to do."

From an entry in Linda's journal:

I was the chef tonight. . . . As usual, I entered quantities of every ingredient that I used into an electronic diet planner which calculates the amount of calories in fat, protein and carbohydrates, and amount of minerals and vitamins consumed per person.

Perched later on a stationary bicycle and ready for a good sprint, I read on the bike's computer display the number of calories I was burning. Had I eaten enough calories to pay for my sprint? Will I grow, shrink, or simply maintain?

If the directors of Bio2 want to run this experiment for a hundred years as planned, the next set of crew members might be slow to step forward if this is to be a mandatory weight-loss program. I asked Linda how much extra agricultural land she thought Biosphere 2 would need to keep biospherians fat. She wrote back with an off-the-cuff estimate, qualified by a lot of "arm-waving" (a scientist's term for guessing). "Given the same conditions we had last fall and win-

ter, we'd probably have to double our area to get fat."

Linda says that estimate assumes a whole year of the same dark clouds that stymied them last fall/winter — the worst "reduced solar season" at the site during the sixteen years of solar records. Already the summer sun has improved yields. It also assumes that the biospherians learn nothing about being "closed-system farmers," a second assumption already not true. It also assumes, Linda says, "that anyone would want to be fat, and that you don't live with Roy!"

Roy is Roy Walford, M.D., their on-board Biosphere 2 doctor, and author of a best-selling book — *The 120-Year Diet*. Based primarily on rat studies, Roy compiled medical evidence suggesting that a reduced-calorie, increased-nutrient diet increases longevity. By keeping mice hungry, but amply fed with nutrients, they lived the equivalent of a 120-year lifespan for humans. As far as I can tell, Roy has also been practicing his theories on himself. He's 68 and sharp. Before closure, he was the leanest healthy-looking person I had seen in a long while.

The biospherians are the first humans to be in a controlled trial of Roy's diet. They expected to lose weight, and to eat less than outside, but they didn't expect to lose so much, or eat so much less. After a year testing out Roy's diet, they would like to eat more. In a conversation with Linda, Whole Earth's Stewart Brand quipped that if the biospherians wanted to get fat, they'd have to "kill and eat Roy Walford." Linda joked back: "Roy would not be my first choice for cannibalism. He's fifth on my list." Yet, because lean Roy has been on a nutrient-rich, low-calorie diet for years, he may have the last laugh. A *Vanity Fair* reporter who interviewed the biospherians on closed-circuit video reports that while the rest are "looking very thin," Roy, in comparison, "looks the best of any of the biospherians."

A favorite idle fantasy for journalists

**A picnic in the remote wilderness of the savanna region of the Biosphere. From the picnic blanket one could toss a pebble into either a desert or a coral lagoon.**

is to imagine the biospherians becoming starving, food-crazy savages in space uniforms. The same notion has occurred to the biospherians themselves. Sometime before closure, the Bio2 crew good-naturedly put on a skit where they played eight biospherians slowly going bush in the Biosphere. Eventually they became cagey hunters creeping through the wilderness areas "stalking the last lizard and the fattest galagoes [a small monkey-like primate]." Reality is less sensational, but the edge of hunger is still there. After nine months inside, Linda Leigh confessed, "We have a lot of bananas ripening in the wilderness. I've been watching this one bunch for four months. It's a cultivar called 'Ice Cream.'"

"Are you and the galagoes fighting over the fruit yet?" I ask her.

"Not yet," she laughs. "But I can see it coming!"

Yet, while the crew flirted seriously with hunger, they had three months' supply of food stashed in the pantry. To be precise: 89 days' worth of calories, 113 days of proteins, and 157 days of fat. For many months prior to closure, the biospherians had sown seeds, weeded, tilled, and harvested a surplus of food raised on their tiny Bio2 plots. They filled plastic thirty-gallon garbage bins to the brim with peanuts, sorghum, rice, and root crops.

During the first six months they all lost weight rapidly as they lived on whatever vegetables they could coax from the plots. A heated debate flared among the biospherians on how deep to tap into the stored food. If they re-



placed any food taken from the store with new food produced at the end, so that upon re-emergence, the net loss from the bank would be zero, what difference did it make? But could they guarantee they could produce that replacement surplus when they were having trouble producing subsistence-level food? In the end they agreed to use the stored food to boost their calorie intake by a mere 250 calories per day. That's as much energy released by a single ice-cream cone, or a handful of peanuts — a mere snack to modern Americans. Almost immediately the meager supplement softened tempers so that arguments were less volatile, and enabled some of the crew to regain weight.

I've heard more than one biospherian talk of newly acquired reverence for the sacredness of food and an appreciation of the world's truly hungry. Biospherian Mark Nelson says, "We don't even know how hungry we really are because we have lived a very easy life. We talk about a calorie-re-

stricted diet, but in fact, we are living better than most people on Earth. Their diet — low in calories and low in nutrients — leads to a shortened life expectancy and health problems: Our diet is fortunately not nutrient-restricted, but nutrient-rich."

Quantity of food isn't everything. All the biospherians have proclaimed the food wholesome and delicious. Birthdays are eagerly anticipated for goodies such as a pizza topped with chicken, tomato and herb sauce, surrounded by goat cheese dressing. Birthday cake is sweetened with bananas and figs. The biospherians are now compiling a cookbook with their favorite recipes for grow-your-own-restricted-diet dishes.

Frequent medical tests performed on the biospherians show a pronounced drop in cholesterol and blood pressure since entering. As soon as everyone had had each other's colds once, colds disappeared entirely. But the crew warn outsiders that the first results of their blood samples "may

shock people" because initial tests show increased levels of pesticides and herbicides in their blood. Since every aspect of the environment within Bio2 is monitored constantly and precisely — it is the most monitored environment of all time — scientists know that there are no pesticides or herbicides anywhere inside. One biospherian who had previously lived in Third World countries had traces of a pesticide that was banned in the US twenty years ago. The current theory is that as the biospherians lost weight, they burnt up fat reserves stored in the past and are now flushing out toxins deposited then. Until Bio2 was built, there was no scientific reason to precisely test people for internal toxins because there was no way to rigorously control what they ate, drank, breathed or touched. Now there is. Just as Bio2 provides an experimental lab for meticulously tracking the flow of pollutants through an ecosystem, it also provides a lab for meticulously tracking the flow of pollutants through a human body.

The biospherians are now reworking their cropping schedule, shifting to raise more plant protein rather than carbohydrates. Roy thinks that may alleviate some of their weight loss. Linda says, "I think that during the second year we have a really good shot at increasing our calories, so that we all get close to the weight that we would like to be. We'll still be lean, but not gaunt. I'd like to get twenty pounds back; I'll settle for ten and not being hungry most of the time."

There is nothing like having your life depend on your gardening skills to quicken the learning curve. The biospherians are pioneering ultra-intensive farming, taking it far beyond even what Chinese rice terracers and European greenhouses have produced. "Roy and I have taken on beans as a personal project," says Linda. "We've vastly increased the yields." She predicts that production of fodder for the animals might increase by half again as much the second year, enabling them to raise animals to a larger size before slaughter.

The two limiting factors for agriculture in Bio2 are light and land. Original calculations forecast that 65 percent of the usable sunlight outside would reach the soil in Bio2. The actual figure, to everyone's shock, turned out to be about 45 percent — less than half — due to the structural space frame itself. It is actually overcast inside. The shade has prompted a search for light inside Bio2. Wherever a bit of sun falls, it is immediately filled with green. The biospherians hunt the premises for "sunfalls." Mark Nelson assigned himself the job of planting "green allies" in any semi-lighted space not used as a path. So far he has planted over 1,000 pots of soil around Bio2. Underground corridors are stuffed with his leafy tubs. He commandeered banks of lights from the basement and set them over soilboxes, producing modest crops of sweet potatoes. He discovered that bananas and papaya yielded prolifically in the reduced "window" light of the lower deck, turning the cel-

**A SMALL PLANET like Bio2 is not christened until it reenacts the human dilemma of choosing between biology directly useful to humans (food), or biology indirectly useful (soil microbes, weeds). Directly useful, we appreciate; but at what point does indirectly useful fade to irrelevancy? Even a world as small as 3.5 acres gets to pose the question.**

lar into a papaya farm. He says, "My goal in the next year is to produce 1,000 pounds of sweet potatoes, and 800 pounds of papaya, food we hadn't counted on."

The biospherians steal whatever sunfall they can get. But that other limiting factor, land, is fixed. They can't steal any more land. Or can they? There's a wilderness area four times the size of their farm just sitting there being wilderness. Why not plow it up and plant potatoes? Since stomachs are hungry, there is a real temptation among the biospherians to pull up some savanna grass and put in peanuts.

Linda is director of the soil-based wilderness and makes no bones about protecting it. She resists the urgings of fellow "agri-imperialists" to plant more human-edible foods in the wild biomes. "The wilderness is designed to provide an occasional bowl of bananas, passion fruits, papaya and various tropical fruits seasonally. . . . Wilderness will continue to be wilderness as long as I'm in here."

Mark, who has been officially concerned with space applications of Bio2, admits, "If we say, 'let's plant a few tubers of taro in the rainforest,' Linda is happy to allow that. But if we go in there prospecting with a spade, she's out front beating back the competitors."

The biospherians are deeply aware of what the wilderness provides them. "If it hadn't been for the wilderness areas we wouldn't have made it through Christmas," Mark says.

Wildlife buffers the atmospheric fluctuations generated during plowing or harvesting agriculture. Garden plants and soil can provide a sufficient atmosphere for eight humans, but one that is liable to choke when a quarter of the plots are rototilled after harvesting. Wilderness offers a deep keel to steady the great cycles.

I guess a small planet like Bio2 is not christened until it reenacts the human dilemma of choosing between biology directly useful to humans (food), or biology indirectly useful (soil microbes, weeds). Directly useful, we appreciate; but at what point does indirectly useful fade to irrelevancy? Even a world as small as 3.5 acres gets to pose the question.

## Babies and Urban Weeds

Bio2 has babies. The most visible was a galago baby born in the early months of the closure. Other births: two African pygmy she-goats birthed five kids; an Ossabaw Island pig bore seven piglets; a checkered garter snake gave birth to three baby snakes in the ginger belt at the edge of the rainforest. And hiding under the rocks are lots of baby lizards. But, as is common on farms and in nature, not all the newborns survived. One infant goat and two piglets didn't make it past infancy.

The bumblebees died, too. And so did the hummingbirds, all four of them. One (out of forty) species of coral in the lagoon went "extinct," but it was represented by only a single individual. All the cordon bleu finches



died, still in their transition cages; maybe they were too cold during an unusually cloudy Arizona winter. Biologist Linda Leigh wonders ruefully whether, if she had let them out earlier, they could have discovered a warm corner on their own. Humans make such remorseful gods. Furthermore, fate is always ironic. Three uninvited English sparrows who snuck into the structure before closure thrive merrily. Linda complains that the sparrows are brash and noisy, even vulgar in their pushiness, while the finches were elegant, peaceful, and melodious singers.

Stewart Brand needles Linda on the phone: "What's the matter with you guys that you don't want to go with success? Keep the sparrows and forget about the finches." Stewart urged darwinism: find what works, and let it reproduce; let the biosphere tell you where it wants to go. Linda confessed, "I was horrified when Stewart first said that, but more and more I agree with him." The problem is not just sparrows. It's aggressive weeds in the artificial savanna, and thorn-scrub grasses in the desert, and other creatures not invited.

Lynn Margulis, outspoken champion of the Gaia Theory, once told me her prediction of the Bio2 ecology. "It'll all go to Urban Weed," she said. Urban Weeds are the opportunistic species, the bully varieties of plants and animals that flourish in the kind of modified habitats that people make — patchwork bits of wilderness, gardens, and buildings. Urban Weeds are cosmopolitan; they become ubiquitous wherever people live. Think pigeons. Bio2, after all, is a patchwork wilderness par excellence. According to Margulis' hypothesis, one would expect to open the doors of Bio2 and find it filled with dandelions, sparrows, cockroaches and raccoons. In fact, five species of cockroaches were purposely introduced into the wilderness as food for the vertebrates, and their populations are booming.

Linda says, "If we didn't tamper



Scott McMullen

**Below the living quarters of the biospherians is one of the more luxurious "barns" in the world, a glass-enclosed animal habitat. Jane Poynter shows off twin baby goats born in June.**

with it — that is, if no humans weeded the ones that were highly successful — I agree that Bio2 could go towards what Lynn Margulis is talking about: a world of Bermuda grass and mallard ducks. But since we are doing selective harvesting, I don't think that will happen, at least in the short run."

I harbor personal doubts about the ability of biospherians to steer the emergent ecology of 3,800 species. The 3,800 will sidestep, outmaneuver, burrow under and otherwise wear down the "keystone predator" the biospherians hope to be, in order to go where they want to go. The cosmopolitan types are tenacious. They are in their element, and they *want* to stay. Witness the curved-bill thrasher, whose story follows.

One day an official from the U.S. Fish and Wildlife Department shows up outside a Bio2 window. The death of the finches had made the TV news and animal-rights activists were calling his office. They wanted his service to check if the finches inside

Bio2 had been collected from wild exotic places and brought in there to die. The biospherians showed the officer receipts and other paperwork that proved the late finches were mere captive-bred store pets, a status that was okay with the Wildlife Department. "By the way, what other birds do you have in there?" he asked them.

"Right now, only some English sparrows and a curved-bill thrasher."

"Do you have a permit for that curved-bill thrasher?"

"Uhhh, no."

"You know that under the Migratory Bird Treaty it's against federal law to contain a curved-bill thrasher. I'll have to give you a citation if you are holding him deliberately."

"Deliberately? You don't understand. He's a stowaway. We tried very hard to get him out of here. We tried trapping him every way we could think of. We didn't want him here before and we don't want him here now. He eats our bees, and butterflies, and as

many insects as he can find, which isn't many by now."

The game warden and the biospherians were facing each other on either side of a thick airtight window. Although their noses were inches apart they talked on walkie-talkies. The surreal conversation continued. "Look," the biospherians said, "We couldn't get him out now even if we could catch him. We are *completely sealed up* in here for another year and a half."

"Oh. Umm. I see." The warden paused. "Well, since you aren't keeping him intentionally, I'll issue you a permit for a curved-bill thrasher, and you can release him when you open up."

Anyone want to bet he won't ever leave?

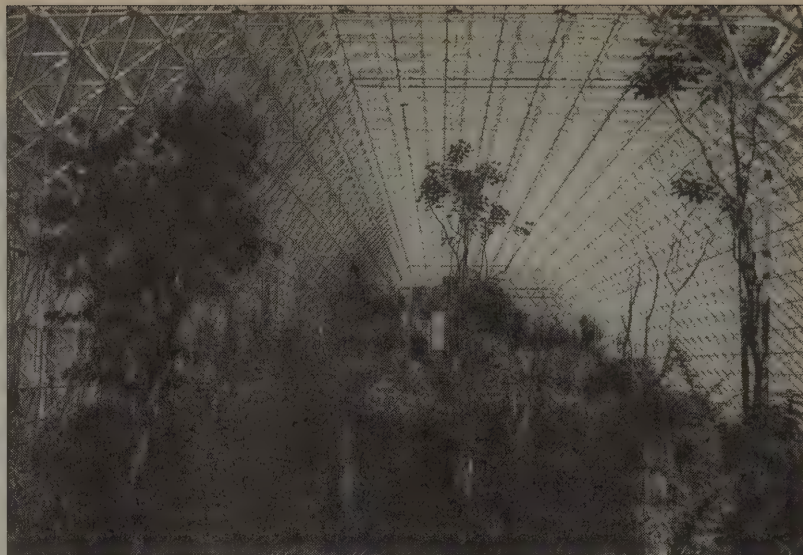
Go with success. Unlike the fragile finches, both the hearty sparrows and the stubborn thrasher like Bio2. The thrasher has his pluses. His beautiful song weaves through the wilderness in the morning.

## Vanishing Acts

Bio2 was built to test how the environment is able to govern organisms immersed in it, and how the organisms in turn govern the environment. The transparent bottle of Bio2 is the ideal seat from which to observe this ceaseless, converging tango. In particular, Bio2's designers realized that the sealed volume of the ark could capture an atmosphere in the act of conversing with life. But to retain a captured atmosphere requires an airtight structure that really is airtight.

In the first year, Bio2 leaked more than the architects had hoped. Rough estimates have it leaking 5 to 10 percent per year, instead of the 1 percent projected by master engineer Bill Dempster. Building an ultra-airtight structure was the numero-uno puzzle confronting the designers of the ark — ultra-tight had never been done before; it had not even been approached. As Dempster is quick to point out, "Less than 10 percent is

Kerri Kelly

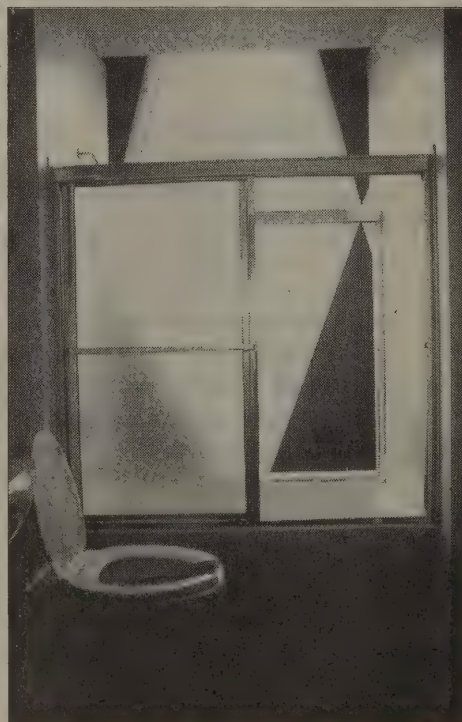


D. P. Snyder



Gaie Alling, director of the marine wilderness areas, relaxes during a July afternoon.

Wayne Thom



Above: A view of the interior wilderness area, looking from the upper subtropical thorn scrub toward the mount in the tropical rainforest. The far glass wall is about a football field away.

Above right: Roy Walford, 68, felt the biospherians were becoming too serious. So he challenged Taber MacCullum, 28, to a spontaneous mud-wrestling match during a rice harvest. Picture-snapping tourists gawk from the windows outside.

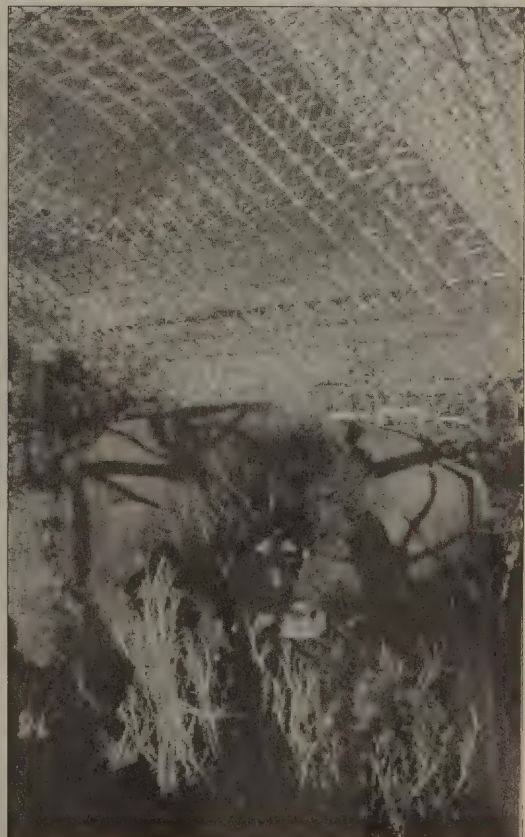
Right: Linda Leigh harvests the September peanut crop in the fields of the agricultural biome.

Far right: Constant measurements of the growth (increase in green matter by weight) of plants in the biosphere provide data to track the cycle of carbon and other elements in a biosphere. Any material cut is measured after drying. Here Linda Leigh works in the fog-desert biome during the first autumn.

Left: The toilets in Biosphere 2 empty into a marshland treatment system operating in a large solarium at the foot of the farm plots. The biologically purified water and wastes are returned to the fields. To conserve water, the toilets use a Japanese design whereby the fresh water refilling the bowl can first be used to wash one's hands in a tiny sink mounted on the back of the toilet.



Abigail Alling

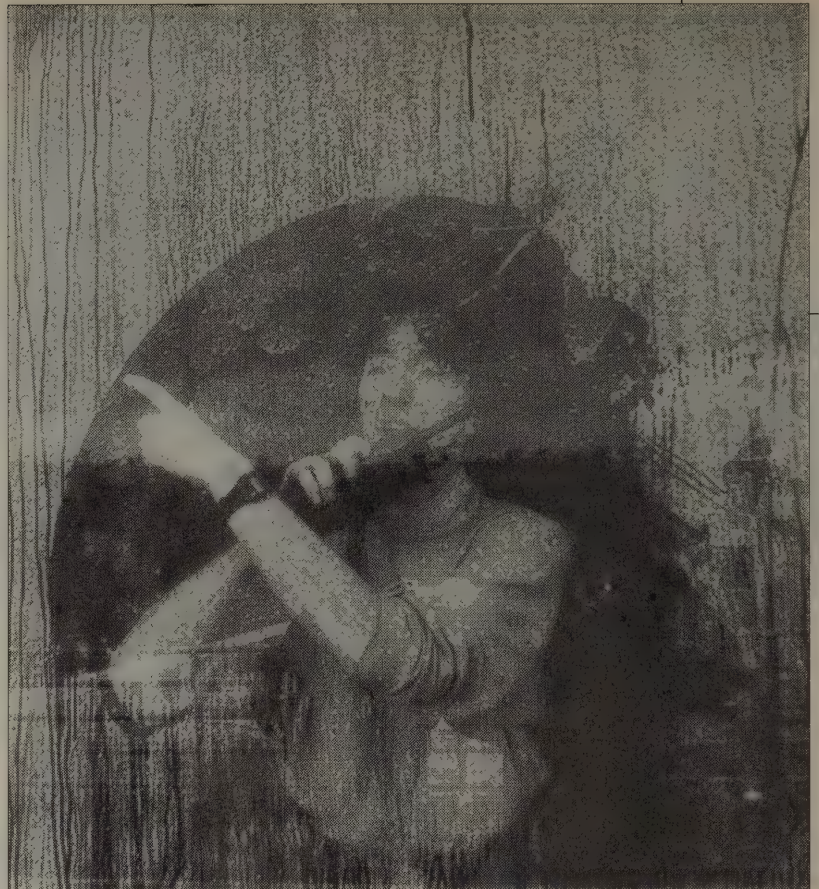


Gill Kenny

still a world record by far. Previous closed-system projects, such as NASA's pilot CELSS project, leaked about 4,000 percent per year." Even the high-tech NASA space shuttle, which one would expect to be sealed quite well, leaks like a sieve — 300 percent, or 50 times the rate of Bio2. A modern "sealed" skyscraper will exchange its air ten times a day. Bio2 exchanges its air once every ten or fifteen years, at worst. Dempster guesses that most of the current leakage seeps through the stainless steel basin under Bio2, and that by testing and re-welding seams during the downtime between closures, he'll eventually attain his 1-percent goal — one change of air per century.

Inside this essentially airtight world, the atmosphere has been full of surprises the first year. It is unexpectedly clean, for one thing. Bio2 was built with an innovative air-cleansing system which can blow its atmosphere up through the bottom of the farm soil-bed, where soil microbes decompose pollutants and remove them from the air. (The bugs do this naturally to some degree in all soils.) Bio2's soil-bed reactor (as they call the device) accelerates this natural process. So far, to everyone's delight, the ordinary action of microbes in the wilderness and agricultural soil has been enough to cleanse the whole Bio2 atmosphere of trace gases without ever turning on the soil-bed system. Trace gas buildup is a horrendous problem in other closed systems such as NASA's space shuttle. Gases emitted by plastics and mechanical gear inside the shuttle combine with gases given off by the astronauts themselves. Over weeks, high levels can accumulate. Mark Nelson says, "Someone figured out it costs about \$100 million a year to keep an astronaut in space, yet those guys are living in the worst environmental conditions you can imagine, worse than a ghetto."

Mark tells of an acquaintance who was honored to greet the returning Space Shuttle astronauts. She is ner-



D. P. Snyder

vous waiting in front of cameras as they ready the door. They open the hatch. She gets a whiff. She pukes. It smells like a toilet/locker room/septic tank. Mark says, "These guys really are heroes, because they are living a lousy life." Perhaps there are stinks not detected among the 60 or so trace compounds measured in Bio2, and like the mythical frog in slowly boiling water, the biospherians don't notice the accumulating smell. After they re-emerge, we may sneak inside to sniff and say, "You know, it stinks in there." But I think it's much more likely that Bio2's attempt to exclude toxin-producing materials and enhance the highly concentrated cleaning soils might keep their atmosphere *cleaner* than Earth's. When they step out they'll say, "Boy, it stinks out here!"

Carbon dioxide levels have meandered up and down. At one point during a six-day sunless period, CO<sub>2</sub>

reached a high of 3,800 parts per million (ppm). To give a sense of where that fits in, ambient carbon dioxide levels outside, where we live, hover steadily at 350 ppm (up from 315 ppm thirty years ago). The interior of a modern office building on a busy street may reach 2,000 ppm, and submarines let their CO<sub>2</sub> concentration rise to 8,000 ppm before they turn on CO<sub>2</sub> "scrubbers." Crew members of the NASA space shuttle work in a "normal" atmosphere of 5,000 ppm. Compare that to a very respectable 1,000 ppm average during a spring day in Bio2. The fluctuations, then, are well within the range of ordinary urban life and hardly noticeable to humans.

But the dance of atmospheric CO<sub>2</sub> does have consequences on plants and the ocean. During the tense days of higher CO<sub>2</sub>, the biospherians worried that increased CO<sub>2</sub> in the air

**Light and radio waves — energy and information — are two of the few things to pass between the barrier separating Biosphere 2 from Biosphere 1. Linda Leigh clears a steamed-up window and communicates to outsiders with a walkie-talkie and hand signals.**

would dissolve in the mild ocean water, increasing the formation of carbonic acid (CO<sub>2</sub> + water), and lowering the water's pH, harming the newly transplanted corals. Discerning further biological effects of increased CO<sub>2</sub> is part of the Biosphere 2 mission.

People pay attention to the makeup of the Earth's atmosphere because it seems to be changing. We are sure it is changing, but beyond that we know almost nothing about its behavior. The only measurement of any historical accuracy we have relates to one component: carbon dioxide. The information on CO<sub>2</sub> concentration — which shows an accelerating global rise over the past thirty years — is due to a single, persistent scientist: Charles Keeling. In 1955, Keeling devised an instrument which could measure concentrations of carbon dioxide in all kinds of environments, from sooty city rooftops to pristine wilderness forests. Keeling obsessively measured CO<sub>2</sub> anywhere he thought the level might vary. He measured CO<sub>2</sub> at all times of the day and night. He initiated continuous measurements of CO<sub>2</sub> on a Hawaiian mountaintop and in the Antarctic. A colleague of Keeling told a reporter, "Keeling's outstanding characteristic is that he has an overwhelming desire to measure carbon dioxide. He wants to measure it in his *belly*. Measure it in all its manifestations, atmospheric and oceanic. And he's done this all his *life*." Keeling is still measuring carbon dioxide around the world.

Keeling discovered very early that

CO<sub>2</sub> in the Earth's atmosphere cycles daily. CO<sub>2</sub> in the air increases measurably at night when plants shut down photosynthesis for the day, and then hits a low in the sunny afternoon as the plants go full steam turning CO<sub>2</sub> into vegetables. A few years later Keeling observed a second cycle: a hemispherical seasonal cycle of CO<sub>2</sub>, low in summer and peaking in the winter for the same reason CO<sub>2</sub> peaks at night: no greens at work to eat it. But it is the third trend Keeling discovered that has focused attention on the dynamics of the atmosphere. Keeling noticed that the lowest level of CO<sub>2</sub>, no matter where or when, would never sink beyond 315 ppm. This threshold was the ambient, global CO<sub>2</sub> level. And he noticed that every year it rose a little higher. By now, it's 350 ppm. Recently, other researchers have spotted in Keeling's meticulous recordings a fourth trend: the seasonal cycle is increasing in amplitude. It is as if the planet breathes yearly, summer (inhale) to winter (exhale), and its breath is getting deeper and deeper. Is Gaia hyperventilating, or gasping?

Bio2 is a miniature Gaia. It is a small self-enclosed world with its own miniature atmosphere derived from living creatures. It is the first whole atmosphere/biosphere laboratory. And it has a chance to answer some of the tremendous questions science has about the workings of the Earth's atmosphere.

The atmosphere of Bio2 is so sensitive that the CO<sub>2</sub> needle rises when a cloud passes over. The shade momentarily slows green manufacturing, which momentarily lets the input flow of CO<sub>2</sub> back up, which immediately registers as a blip on the CO<sub>2</sub> meter. On a partly cloudy day Bio2's CO<sub>2</sub> graph shows a string of little atmospheric hiccups.

Despite all the attention CO<sub>2</sub> levels have garnered in the past decade, and despite all the scrutiny agriculturists have given to the carbon cycle in plants, the fate of carbon in the Earth's atmosphere is a puzzle. It is

generally agreed by climatologists that the curve of increasing CO<sub>2</sub> within modern times very roughly matches the rates of carbon-burning by industrial humans. That neat fit leaves out one astounding factor: when measured more precisely, only half of the carbon now burned on Earth remains in the atmosphere as increased CO<sub>2</sub> levels. The other half disappears!

Theories for the lost carbon abound. Three theories dominate: 1) it is being dissolved in the ocean, and then it precipitates to the sea bottom as carbon rain. Or 2) it is being deposited in soils by microbes. Or 3) most controversial, the lost carbon is fueling growth of the world's savanna grass, or being turned into tree wood, on an imperceptible but massive scale that we haven't yet been able to measure. CO<sub>2</sub> is the accepted limiting resource for the biosphere. At 350 ppm, the concentration of carbon dioxide is only a faint .03 percent — a mere trace gas. A field of corn in full sunshine will deplete the available CO<sub>2</sub> within a zone three feet above ground in under five minutes. Even small increases in CO<sub>2</sub> levels can boost biomass production significantly. Accordingly, wherever we aren't cutting down forests, trees are putting on extra weight due to the 15 percent of additional CO<sub>2</sub> "fertilizer" in the air, perhaps even at a rate greater than they are being destroyed elsewhere.

So far, the evidence is confusing. But in April of 1992, two studies published in *Science* claimed that the ocean and biosphere of Earth are indeed stockpiling carbon at the scale needed. One article shows that European forests have gained 25 percent or more tree flesh since 1971 — despite the negative effects of acid rain and other pollutants. But to tell the truth, hardly anyone has looked at the global carbon budget in detail. A global ignorance of the global atmosphere makes the Biosphere experiment very promising. Here in the relatively controlled conditions of a sealed bottle, the links between an op-

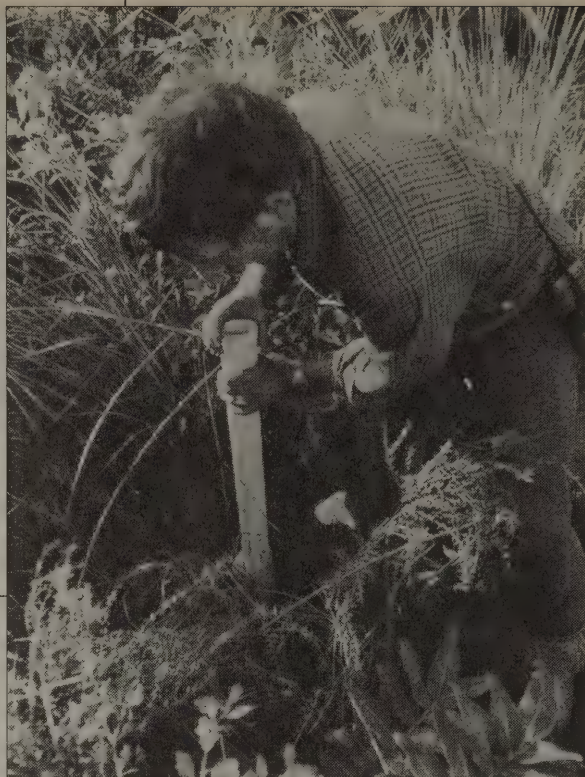
erating atmosphere and a living biosphere can be explored and mapped. The amounts of carbon in the atmosphere, in the soil, in the plants, and in the ocean of Bio2 were carefully measured before closure. As the sun heats up photosynthesis, the carbon is moved from air to living things by amounts that can be measured and are meaningful. Each time any plant material is harvested, it is laboriously weighted and recorded by the biospherians. They can perturb the system slightly to see how it changes — for instance, when Linda Leigh “turns on the savanna” with artificial summer rains, the biospherians make simultaneous measurements of carbon levels in all domains of subsoil, topsoil, air, and water. At the end of two years, they’ll have a rich chart of where all carbon lies. By saving dried samples of leaf clippings, they can also (somewhat) trace the route of carbon as it travels within the surrogate world by following shifts in the ratio of naturally occurring carbon isotopes.

Carbon is only the first mystery. The riddle deepens. Oxygen levels are a bit lower inside Bio2 than outside. Since closure, oxygen has dropped from 21 percent of the atmosphere to 17 percent. There is no danger for the biospherians. A 4 percent drop in oxygen concentration is equivalent to Bio2 being transported to a site at a higher elevation, with a thinner atmosphere. The residents of Aspen, Colorado thrive at a similar, slightly reduced oxygen level. If oxygen sinks further, to 15 percent, it will shift Bio2 to approximately the altitude of Lhasa, Tibet, where people still breathe fine, after acclimation.

Though safe, the drop in oxygen levels is bewildering. In a sealed bottle, where does disappearing oxygen go?

Unlike the lost-carbon riddle, the mysterious oxygen vanishing act in Bio2 was completely unexpected. In a quick survey of the scientific literature, biospheric researchers found little data concerning atmospheric oxygen levels at all. The only known (but little-reported) fact is that oxy-

**A core of soil is removed and replaced with a steel-mesh basket of fresh soil. At a later date the core can be removed and the root growth measured to determine the total biomass and the amount of carbon held underground.**



gen in the atmosphere of the Earth is most likely also disappearing. Nobody knows why or even by how much. In a 1992 book, *From Eros to Gaia*, the renowned physicist Freeman Dyson muses:

You might imagine that one of our busy scientists might have measured the rate at which the oxygen in the atmosphere is being used up. The reservoir of oxygen in the atmosphere is large but not infinite. It amounts to 1.2 million gigatons. Since 8 tons of oxygen are used up for every 3 tons of carbon burned, and we are burning 6 gigatons of carbon per year, we might expect that the oxygen is being used up at a rate of about thirteen parts per million per year. Thirteen parts per million should be measurable. The measurement is not easy, but with modern precise instruments it should be about as difficult to measure oxygen today as it was for Charles Keeling to measure the carbon dioxide

when he began his work thirty-two years ago. All we need is an individual scientist willing to dedicate her life to the oxygen measurements as Keeling dedicated his life to carbon dioxide.

Ten years ago a panel of scientists recommended to the U.S. Department of Energy that a program of oxygen measurements be started. Nothing happened.

Speculation is that the oxygen in Bio2 may be tied up in the newly minted soil, perhaps as the oxygen part of carbonates formed by microorganisms. Some of the atmosphere has turned into rock. Since the soils of earth are generally old, this would not explain the removal of oxygen from the Earth’s atmosphere, if the true amount of loss is significant.

“I am surprised that the general public all over the world is not clamoring to know how fast we are using up the oxygen,” writes Dyson.

And why stop there? Several experts

**T**AKE A DRY, dormant savanna, desert or thorn scrub and rouse it into spring with rising temperatures. Soon a thousand leaf buds swell. Then pour on the rain. Bam! In four days the plants explode into leaf and flower. The awakened biome sucks up CO<sub>2</sub>. Once up, the biome can be kept awake past its normal retiring time by pruning old growth to stimulate new CO<sub>2</sub>-consuming growth.

watching the Bio2 experiment have suggested that tracing the comings and goings of atmospheric nitrogen should be next. Although nitrogen is the bulk component of the atmosphere, its role in the Great Cycle is known only broadly. Like carbon and oxygen, what *is* known has been extrapolated from reductionist experiments in the lab and computer modeling. Others have proposed that the biospherians map the element sodium or phosphorus next. Bio2 is ideal for such experiments. As a "cyclotron for the life sciences" it offers a place to dissect planetary-type systems.

## An Atomic Economy

Generating big questions about Gaia and the atmosphere may be Bio2's most important contribution to science. In *Buzzworm*, an environmental magazine, Linda Leigh describes the concrete view of Gaia the inhabitants get:

In Bio2 we have created an economy based on a currency of atoms: carbon, nitrogen and oxygen. Instead of beginning the day by reading a Dow Jones ticker . . . I rush to the computer screen to view updated graphs of carbon dioxide in the atmosphere and nitrates in the ocean. Carbon is the major commodity in this small world stock market. Deficits and profits compound daily. Have the previous day's carbon outputs, via photosynthesis, balanced the

carbon inputs, via respiration?  
If not, what action can we take?

When the CO<sub>2</sub> levels first began to rocket inside, the biospherians launched a countermove to limit the CO<sub>2</sub> rise. The chief tool to leverage the atmosphere was deployment of an "intentional season." Take a dry, dormant savanna, desert or thorn scrub and rouse it into spring with rising temperatures. Soon a thousand leaf buds swell. Then pour on the rain. Bam! In four days the plants explode into leaf and flower. The awakened biome sucks up CO<sub>2</sub>. Once up, the biome can be kept awake past its normal retiring time by pruning old growth to stimulate new CO<sub>2</sub>-consuming growth. As Linda wrote in her journal in late fall, "With short days of winter approaching, we have to prepare for reduced light. Today we began to prune back the ginger belt on the north edge of the rain-forest in order to stimulate rapid growth . . . a routine atmosphere management task."

To reverse this "CO<sub>2</sub> valve" and flood the air with carbon dioxide, the biospherians haul back the tons of dried grass clippings they removed earlier. The clippings are piled on the soil as mulch, and wetted. As bacteria decompose it, they release CO<sub>2</sub> into the air.

Linda recounts what it's like to engage in the hard manual toil of managing one's own atmosphere:

Visitors appear at the window with cameras; they aim and shoot as we slice through the vegetation with our sickles and machetes. I feel distinctly aboriginal in this world. As I wonder what the visitors must be thinking and saying, I formulate new explanations for what I am doing — winter cleaning of the atmosphere. Depositing the carbon into our account for safekeeping so that we can spend it next summer when we will need it for long days of plant growth. Making the connection between the world of life and the air we are breathing.

In a molecule economy, the underground areas where the plant clippings are dried serve as a carbon bank. Carbon is lent as needed, and primed with water. Water in Bio2 is diverted from one locality to another like so much federal spending meant to stimulate a regional economy. By channeling water onto the desert, CO<sub>2</sub> shrinks; by channeling the water onto the dried mulch, CO<sub>2</sub> expands. On Earth, our carbon bank is the black oil under Arabian sands (but all we do is spend it). Among all the other things Bio2 does, it compresses geological time. When the biospherians store plant biomass, they mimic the sedimentary storage of carbon in fossil fuels under the Earth, far removed from the atmosphere. When the biospherians deposit excess CO<sub>2</sub> in a scrubber, the device binds carbon dioxide into limestone. In Gaia, the heat of Earth and volcanoes releases the carbon stored under the Earth, but the biospherians do it by hand.

They are fiddling with "geological" adjustments of carbon — storing and withdrawing carbon atoms in bulk — in the hope of roughly tuning the atmosphere. They currently tinker with the ocean, lowering its temperature, adjusting the return of salty leachate, nudging its pH, and simultaneously guessing on a thousand other variables. "It's those few thousand other variables that make the Bio2 system challenging and controversial," says

Linda. "Most of us are taught not to mess with even two simultaneous variables." If they are lucky, they'll temper the initial wild oscillations of the atmosphere and ocean with a few well-chosen drastic actions. They'll ride the props until the system can cycle through the year relying only on the natural action of sun, seasons, plants and animals to keep it in balance. At that point the system "pops."

"Pop" is the term hobbyists in the saltwater aquarium trade use to describe what happens when a new fish tank suddenly balances after a long, meandering period of instability. Like Bio2, a saltwater fish tank is a delicate closed system that relies on an invisible world of microorganisms to process the waste of larger animals and plants. It takes a month or two for the various bacteria to develop a food web and to establish themselves in the gravel of the start-up tank. As more species of life are slowly added to the embryonic aquarium, the water becomes extremely sensitive to vicious cycles. If one ingredient drifts out of line (say, the amount of ammonia), it can kill off a few organisms, which decompose to release even more ammonia, killing more creatures, thus rapidly triggering the crash of the whole community. To ease the tank through this period of acute imbalance, the aquarist nudges the system gently with judicious changes of water, select chemical additives, filtration devices, and inoculations of bacteria from other successful aquariums. Then after about six weeks of microbial give-and-take — the nascent community teetering on the edge of chaos — suddenly, overnight, the system "pops" to zero ammonia. It's now ready for the long haul. Once the system has popped, it is more self-sustaining, self-stabilizing, not requiring the artificial crutches that set-up needed.

What is interesting about a closed-system pop is that most of the conditions the day before the pop and the day after the pop don't change. Be-

**A fairly compact Japanese rice-hulling machine set up in the basement of Biosphere 2, where the food processing is done. Any kind of farm machinery can be dangerous; Jane Poynter lost her fingertip to a nearby threshing machine.**

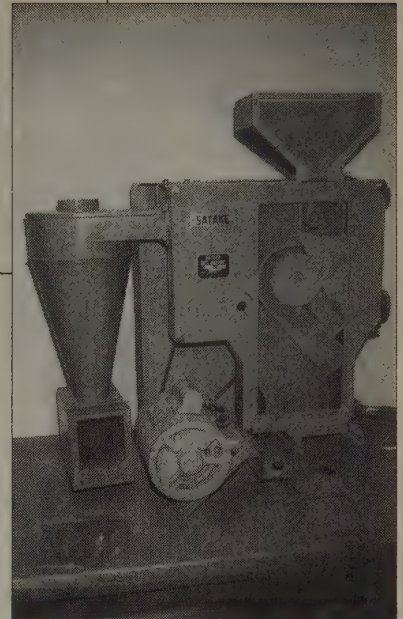
yond a little babysitting, there is often nothing one can do except wait. Wait for the thing to mature, to ripen, to grow and develop. "Don't rush it," is the advice from saltwater hobbyists. "Don't hurry gestation as the system self-organizes. The most important thing you can give it is time."

Bio2 is ripening. It suffers from wild infantile oscillations that require "artificial" nurturing to soothe. It has not popped yet. It may be years (decades?) before it does, if it ever does, if it even can. That is the experiment.

## The Paperless Life

The crews work barefoot, planting rice by hand. Jeans rolled up, shirts wet with sweat, they toil bent-backed in the warm humid sun. They could be Third World peasants, except they each have a walkie-talkie clipped to their belt. Bio2 is so huge that it's possible for one biospherian not to see the others during the day. To keep in contact they wear personal walkie-talkies from the moment they get up. They congregate for communal meals, beckoned by a "dinner chime" (a different tune composed on the spot for each meal) broadcast to all the radios. A telephone is never more than a few steps away, even in the wilderness. Underneath the rainforest's hollow mountain a phone hides in a concrete cave. You can talk to your brother on it while you hunt for signs of a newborn bushbaby. Each biospherian has two personal phone lines (office and apartment) and a personal fax, as well as email and voicemail addresses.

While the biospherians collect their coffee treats bean by bean, while they



Kevin Kelly

thresh and winnow their own grain so that they can grind flour to bake bread ("Pizza takes four months to make," they say), and while they explore the boundaries of agricultural self-reliance, they are also pioneering a paperless life. Is paperless living a step backward to a peasant past, or a step forward to the future perfect? Or both?

Biospherians have mail but no stationery, faxes but no fax paper, computers but no printers. They are living a future long predicted by futurists. Once deprived of paper, the biospherians quickly lost their dependence on it — although not without some inconvenience, since they traffic in huge amounts of information. Typical information chores include recording data from hundreds of sources, generating reports, writing scientific papers, communicating with far-flung consultants, researching, and answering the questions of journalists. They can receive books electronically, but find them hard to read because the text is missing the highly evolved niceties of typography — italics, bold, varying type size, page formatting. They prefer to read things as electronic faxes on a screen because the



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text retains its visual design. Unfortunately, faxes, even paperless ones, aren't editable. Biospherians have electronic notebooks for entering field data, but they don't use them much. Linda, ever the biologist, wrote me an email note: "All of my field and laboratory notes are in notebooks and handwritten. . . . There is something rather satisfying about the handwritten natural history journal and plant phenology data, complete with drawings, mud from being dropped into the billabong and the occasional squashed *Drosophila*." Her preferred way of recording measurements in Bio2's fields is to read them off into her walkie-talkie to a partner in front of a keyboard. In the same email note Linda says, "My major problem with paperlessness is the same as when I squandered paper . . . how to file it so that the information is retrievable."

The biospherians' idea of fun is to link up with another set of confined adventurers and commiserate. On a call patched by a ham radio operator, the crew of Bio2 chatted with eight members of a scientific team stationed at the South Pole. The South Pole crew was "alone together" for a year, living in a 50-meter-wide geodesic dome. Both teams were into home brewing (banana and rice wine for the biospherians). A few days before the call, the sun had set for the South Pole station's very long night. Average temperature outside during six months of darkness: minus 70 degrees F. Back in Arizona, the Bio2 crew was confined to a tropical forest ripe with fresh papaya and a tiny coral lagoon. That helped lift the biospherians'

spirits. (The South Polers wonder, "What would it take to build one of those here?")

They are not always so cerebral. The rice harvest is a communal job. After the rice is cut, the whole gang drains the field, and catches the fish flopping in the puddles. Then they merrily stomp in the thick mud to rid the soil of old roots. To celebrate the summer rice harvest (there are three a year), the crew threw a mud-wrestling contest. While Linda refereed, biospherians flipped each other into their precious (and expensive) life-support mud. Tourists watched through the windows, perplexed. One biospherian said, "Roy got it going. I didn't know he had it in him. He was jumping off the space frame into the goop."

I was wrong about one prediction I had made in my previous article about Bio2 before closure. From the figures I was given on workloads and the amount of care needed to grow food, it seemed to me that biospherians would devolve into eco-serfs toiling all day in the rice fields. But rather than the four to six hours per day of farm labor that I anticipated, the biospherians average only three hours per day growing, harvesting, or cleaning food. Besides increasing yields, they also hope to eventually lower agricultural hours to two per day per person. This gives plenty of spare time for snorkeling in the coral reef or mud wrestling. Indeed, they have already cut some of the amount of work they need to do. One of their first group votes was to ban any meetings or mandatory work

on Sundays (except, much like other farmers, the feeding and milking of animals).

## The Next Generation

When everything works, and free time loosens up daydreams, the biospherians can wonder, What's next? A Bio2 at the South Pole? Or a bigger Bio2 with more bugs and birds and berries? How about a smaller Bio2? My own back-of-the-envelope calculations suggest that a sealed glass structure the size of a house would be enough to support one person, maybe two, in a biospherian lifestyle. You'd need a two-acre lot in full sun. The structure sits in the middle. The rest of the lot is paved with solar panels. The greenhouse is carpeted with serious intensive agriculture. The basement is molded into an apartment. All air, water, food circulates inside by means of solar-driven pumps, fans, and microbe mats.

Your only food is what you can grow. Right now, what you can grow in a greenhouse is fairly limited. Only certain crops are highly productive in the moist, moderated climate of a glass Gaia. The usual varieties of wheat are difficult to grow inside. State ag-school professors say, "Why would anyone want greenhouse wheat when you have Kansas?" Perhaps someday, seed companies will offer special varieties of common foods for the dedicated biospheric niche. But even if you can grow cocoa beans, making chocolate from them is a separate achievement, as the biospherians have discovered. Living in a biosphere gives you a non-fattening diet, limited foods, and three hours (or more) of work every day on food alone.

On the plus side, living in a household biosphere gives you a 100-percent nontoxic environment. You control what air you breathe, what water you drink, what compounds you eat. For those with deep concerns about toxins, or those suffering from debilitating allergies, or those afflict-

ed with Howard Hughes-type paranoia, a personal biosphere might be good news.

A single fiber-optic cable snakes to the home Bio2 to deliver the universes of telephone, TV, music, and computer everything. A purist worried about cooties coming in on the wire could insist on a solar-powered satellite hookup. By air or by wire, you import the essence of global village. With virtual-reality gear, it might not be lonely. At any rate, there is an air lock, for vacations and visitors.

A personal biosphere is only a couple of jumps away from a long American tradition of self-sufficient homesteads. That tradition brought forth the Alaskan log hut in the wilderness, the off-the-grid Northern California mountain home, and the ecological high-tech ark of New Alchemy Institute. A personal household biosphere is the pinnacle of self-sufficiency. You drink your own recycled pee, breathe your own recycled farts, eat your own recycled shit. Not only do you make your own granola, you make your own atmosphere! Stocked inside the sealed homestead are durable appliances, mendable clothes, paperless notebooks. The mantra is: No garbage in, no garbage out.

Given the amount of money a biospherian could save (no car, no restaurants, no mail-order catalogs, no utilities), a homestead biosphere may make economic sense. People certainly spend money and time on weirder things. Whether the biospherians know it or not, they are pioneering the technology of ultimate self-reliance. They have planted a seed worldwide. The question is: how small can it be miniaturized? Those master miniaturists, the Japanese, are crazy over Biosphere 2. In one poll conducted in Japan, over 50 percent of the population recognized the project. To those used to claustrophobic living quarters and the isolation of island living, a mini-Bio2 seems positively charming. In fact, one government department in Japan has announced plans for a Biosphere

Kevin Kelly



**A simulated mountain (concrete) rises in the artificial mist (from tiny nozzles) of a synthetic jungle (real cloudforest plants from many locations). The sum is an absolutely real Biosphere 2 rainforest of remarkable stability and potency.**

J. The "J" stands not for Japan (they say), but for Junior, as in tinier. Official sketches show a small warren of rooms, lit by artificial lights and stuffed with compact biological systems.

The eco-technicians who built Bio2 have figured out the basic techniques. They know how to seal the glass, schedule perpetual subsistence crops in a very small plot, recycle their wastes, balance their atmosphere, live without paper, and get along inside. That's a pretty good start for biospheres of any size. The future should birth Bio2s in all sizes and varieties, housing every combination of species. As Mark Nelson says, "In the future there will be an enormous proliferation of niches for biospheres." Indeed, he sees varieties of biospheres of different sizes and composition competing over territory, mingling to share

genes, and hybridizing as if they were biological organisms. Planets would be settled with them, and every city on Earth would have one, for experiments and education.

## Ultimate Technology

A year from now when the biospherians re-emerge through an airlock, a second crew of eight, now in training, will enter the airtight ark after a six-week hiatus. The airlock will close behind the new crew and they will travel without moving for a year ("I feel I am far out in space," says one biospherian. "At night it's like being on another planet," says another). Space Biosphere Ventures plans to run closures for the next two decades at least. At this rate, Biosphere 2 presents a young person more opportunities for a high-profile mission in space technology than faltering NASA can.

**A** S BIO2 helps prove, life is a technology. Life is the ultimate technology. Machine technology is a temporary surrogate for life technology. As we improve our machines they will become more organic, more biological, more like life, because life is the best technology for living.

In the paramilitary atmosphere of pre-closure (since changed) there was one ironclad rule on the Bio2 site. Visitors, especially press, must be escorted everywhere, all the time. I always had an official shadow, even though most of the site is empty desert. (This overzealous guardedness and secrecy is partly why the media tended to believe that Bio2 was hiding something.) The Bio2 officials don't know this, but just before closure they inadvertently abandoned me in the Biosphere one evening. My escort assumed I was with someone else, and that someone else left thinking my escort was returning. The construction workmen had all gone home for the day, the staff was up in the hill turning lights out, and there I was in the nearly completed Biosphere by myself. It was eerily quiet in the agricultural biome. I felt I was standing in a cathedral. I could barely hear the muffled thump of the distant wave machine in the ocean, as it exhaled a wave every twelve seconds. Near the machine — which sucks up ocean water and then releases it in a wave — it sounds, as Linda Leigh says, like the blow of a grey whale. Back in the garden where I stood, the distant deep guttural moan sounded like Tibetan monks chanting in the basement.

Outside, brown desert at dusk. Inside, a world thick with green life. Tall grass, seaweed adrift in tubs, ripe papaya, the splash of a fish jumping. I was breathing green, that heavy plant smell you get in jungles and swamps. The atmosphere moved slowly. Water cycled. The space-frame structure

creaked as it cooled. The oasis was alive, yet everything was still. Quietly busy. I could sense the work of life. It was as if the invisible chanting monks had moved upstairs and were now surrounding me, silently rocking.

The sun had nearly set. Its light was soft and warm on the white cathedral. I could live here, I thought. There's a sense of place. A cave coziness. Yet open to the stars at night. A womb with a view. Mark Nelson had told me, "If we are really going to live in space like human beings, then we have to learn how to make biospheres." He said that the first thing macho, no-time-for-nonsense cosmonauts did after floating out of bed in the Soviet skylab was to tend their tiny pea seedling "experiments." Their kinship with peas became evident to them. We *need* other life.

On Mars, I would only want to live in an artificial biosphere. On Earth, living in an artificial biosphere is a noble experiment, suitable for pioneers. It is literally living inside a giant test tube. Great things will be learned inside Bio2 about our Earth, ourselves, and the uncountable other species we depend on. I have no doubt that someday what is learned here will land on Mars or the Moon. Already it has taught me, an outsider, that to live as human beings means to live *with* other life. The nauseating fear that machine technology would replace all living species has subsided in my mind. We'll keep other species, I believe, because, as Bio2 helps prove, life is a technology. Life is the ulti-

mate technology. Machine technology is a temporary surrogate for life technology. As we improve our machines they will become more organic, more biological, more like life, because life is the best technology for living. Someday the bulk of the technosphere in Bio2 will be replaced by engineered life and lifelike systems. Someday the difference between machines and biology will be hard to discern. Yet "pure" life will still have its place. What we know as life today will remain the ultimate technology because of its autonomy — it goes by itself, and more importantly, it learns by itself. Ultimate technologies, of any sort, inevitably win the allegiance of engineers, corporations, bankers, visionaries, and pioneers — all the agents who were once other life's biggest threat.

In my first report, I said that Bio2 would teach humans "how to live within nature and with our machines." I'd like to revise that. Bio2 is teaching humans how to live within nature, and machines how to become nature.

The glass spaceship parked in the desert is called a biosphere because the logic of the bios (bio-logic, biology) runs through it. The logic of bios is uniting the organic and the mechanical. In the factories of bio-engineering firms and in the chips of neural-net computers, the organic and the machine are merging. But nowhere is that marriage between the living and the manufactured so clear as in the pod of the Bio2. Where does the synthetic coral reef end, and the chanting wave machine begin? Where does the waste-treatment marsh begin, and the toilet plumbing end? Is it the fans, or the soil bugs, that control the atmosphere?

The bounty of a journey inside Bio2 is mostly questions. I sailed in it for only ten hours, and got years of things to consider. That's enough. I turned the massive handle on the air-lock doors in the quiet Biosphere 2 and debarked into a twilight desert. Two years in there would fill a lifetime. ☘

## Sailor Song

Ken Kesey tells us how things went about thirty years from now, in a remote Alaskan fishing village under attack by worldwide environmental and social degradation, and invaded by a Hollywood film company. He unfolds his fabulous and arcane legend a little at a time, tantalizing and full of tricks. The individualistic, desperate and often hilariously rambunctious characters may seem a tad exaggerated to readers who have never lived in boondock Alaska, but I (who have) would not be surprised to find out that Mr. Kesey has hoisted a beer with most of them. It's a cautionary tale. It's a love story. It's good. And it's true. —J. Baldwin

• “Thy voyage through folly and filth is almost finished. The harbor light beckons, the good light of the cleansing flame beckons, just over the bar, the good, sweet, promised light of the Fire Next Time —”

“Ice Next Time,” interrupted the voice from the cot. “Ice Next Time, slimebrain. I can prove it mathematically!”

Still the man gave no indication that he had heard Billy's slurring contradictions. He remained motionless on his folding chair,

coolly smiling into Greer's agitated face. Ike could feel the heat building despite that cool smile, like the orange sun on his cheek.

The soft voice continued. “But thou knowest, Brother Emil, how the sick dog is like to return to its vomit? How the bathed sow is like to go rolling in the mire? Thou knowest this to be so, ain't I correct?”

Greer nodded emphatic agreement; he'd seen his share of dogs and sows.

“Then I beg you, Blood, leave the company of them beasts. Rise up. Rise up with us here in Beulahland. Leave them. Come to us. We have been shown the way. The route to salvation is charted in simple tradition — sweat of the brow . . . fruit of the fields. Doesn't thou believe in tradition, little brother?”

“You bet,” said Greer.

“Look about you. We have raised ourselves a home above that filth down there. Join us. The choice is yours. You can till this clean land here in the sanctuary of the clouds or you can perish below in the flaming filth, in the final terrible, horrible, inescapable fire fire fire!”

“Ice,” said the voice from the cot. “Ice ice ice — !”

“FIRE!” Greener suddenly thundered, standing. “Fire, you blaspheming peace-o'-shit faggot! Fire and tribulation such as was not since the beginning of the motherfucking world! I know your kind — the Spirit of the Antichrist is the mystery of iniquity — all of you asshole faggots know the world is looking for a man! to show them the way out! of these difficulties of your own iniquitous brewing! And one day in the future it cannot be fucking much further off the diseased Spirit of the Antichrist shall fill the houses of God and make in them such dins of iniquity that every babe's heart shall be infected with the poisons of the Babylon!”

He began to stamp about the plank porch, pounding his fists together.

“Troubled water? Shit, man, you kidding? It's a sewer — a fucking flaming sewer! And for a bridge over it where shall you look? Into the churches? Nay, for they are filled with blasphemy and blackjack tables. Into the human heart? It has become a cesspool, a swamp, the mire that leadeth to madness. Into Heaven then? Through the almighty mystery of the gates into sweet Heaven above? Shit a mother brick no! We can't hardly get through the air plution let alone the mystery of the gates. Nay, there won't be no place

## PrairyErth

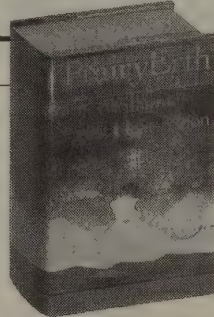
Every now and then you find someone who is trying to do something quite different with the form of a book. When they succeed, it's often hard to describe what they've done.

William Least Heat-Moon has attempted to evoke a place. He chose Chase County, Kansas. This is not a history of Chase County — though you learn a lot of the history — and it is not a description, though you begin to feel the openness of the sky and grass. What it is, is a quest for understanding of the land and its various people, approached in a nonlinear construct that comprises interviews, research, and lots of walking to try to understand this piece of the country. One of my favorite parts is the “Common-place Book” at the beginning of each section, filled with quotes old and new about the land and how people perceive it.

Though it may seem an awfully large book about one county, it was only through the accretion of detail that I began to realize what makes place.

—Kathleen O'Neill

• Kansas and its forms have been translated as wind, windy, wind people, south wind people, those-who-come-like-wind-across-the-prairie, swift, swift wind, swift river,



### PrairyErth

(A Deep Map)

William Least Heat-Moon, 1991; 624 pp.

**\$13.95** (\$15.45 postpaid) from Houghton Mifflin Company/Mail Order Dept., Wayside Road, Burlington, MA 01803; 800/225-3362 (or Whole Earth Access)

swift water, smoky water, fire people, plum people, disturbers, troublemakers, filthy, and cowards. Dispense with the freak translations like the last four, and you have a people defined by three of the four ancient elements.

■ *Eternal prairie and grass, with occasional groups of trees. [Captain John] Frémont prefers this to every other landscape. To me it is as if someone would prefer a book with blank pages to a good story.* —Charles Preuss, *Exploring with Frémont* (1842)

*Tourists through Kansas would call this place dull enough, but then so much of the interest of a place depends on its traditions. For a pass-*

*ing traveler in search of pleasure, it certainly possesses few attractions. But a [correspondent], in pursuit of useful knowledge for the reading public, observes things differently.*

—Henry Stanley, *My Early Travels and Adventures in America* (1867)

• I headed out to look for Fisher's cabin site. Hoping for a foundation corner, a hearthstone, something, I found nothing, and I ended up idling by the cold meeting of the waters, and I realized how little of the Cottonwood you commonly see because of its deep, narrow, wooded channel through the county. I clambered up the bank and began breaking my way through the tangles along it in a kind of river hike. Just west of the railroad bridge over the Cottonwood, I came out onto a tall and massive and marvelously laid stone abutment with a matching one on the bank opposite, the cut rocks as big as any you can find here. It was apparent the abutments were old yet never used and that somebody had gone to considerable expense for no purpose. I'm as susceptible as anybody to the romance and mystery of hidden ruins, especially ones in rock. I made my way back to the road and got asked the usual question by a fellow in a pickup, *Trouble?* and I told him about the abutments, and he said, *It's the old Orient line, and moved on*, and I thought, *Old Og again, the ignis fatuus*. I walked and considered, and finally I said, *find it or bury it*.

to look! No place to turn. The seas'll be boiling, the rocks burning, the moon bleeding like a *ho'* ripped up by some cheap abortionist. The heat be *on!* Credit cards canceled, real estate deals going up in smoke. Bank accounts on fire! On fire fire fire!"

■ Carmody's girth was the result of a lifetime of hard labor and good appetite, laced liberally with drink and dance whenever possible. The belly he had produced was the accomplishment of nearly three-quarters of a century's dedicated effort; he was famous for it and proud of it. He used it like a sumo wrestler uses his kee, or center. It was his workbench, his fulcrum on the booms, his block and tackle on the ropes. Now, as they hummed along, he had it belied up against the round cedar table that occupied the center of the galley, leaning on it while he chopped a ten-pound halibut into steaks.

"A fish don't really object to being caught and consumed," Carmody was explaining, "long as it happens fresh."

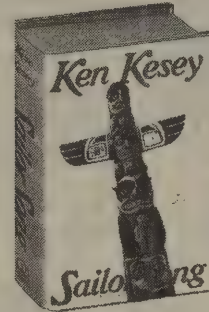
The fish was truly fresh; the glimmer of life had not yet completely left the animal's freakish eyes, and the body was still quivering there on the table, though big slabs of

him were already hissing in butter and chopped parsley in the wavepan.

"Fish understand the fishy facks of life. They get et. It's their destiny from the get-go, from the least to the largest, to get et. What a fish objects to is being wasted. 'If you need me, catch me; if you don't, let me be.' Back in the days we really needed whale oil you never heard any whales complaining, did ye? They knew they was greasing the wheels of progress. They didn't commence complaining about it until they found out their oil had become obsolete, progress-wise, and all we wanted them for was food for cats. That's when they organized Greenpeace. Because fish got *pride*. Oiling a gyroscope in a battleship is one thing, feeding the family kitty-cat is another."

● About all he was able to conclude was that all the authors agreed the End of the World was just around the corner and that it was Somebody's fault. Somebody else's, of course. The Greens blamed the Burners and the Burners blamed the Breeders — "The bellies just kept doubling and doubling and so did the Protein Producing Acreage" — and the Breeders blamed the Pro-Choicers. "They interfered with God's

Natural Law. 'Go forth and multiply,' He commanded. Things would have evened out. The Great White Tooth of Famine would have eventually gnawed the problem clean. But the Choicers interfered. And now He's pissed, and everybody is condemned to reap the fiery whirlwind that those faithless freeloaders have sown."



### Sailor Song

Ken Kesey, 1992 (Viking Penguin); 528 pp. **\$23.50** (\$25.50 postpaid) from Penguin USA/Cash Sales, 120 Woodbine Street, Bergenfield, NJ 07621; 800/253-6476 (or Whole Earth Access)

## The Voice of the Earth

Here is a wise and tasteful grand synthesis of the new cosmology and the new physics. It's an argument that there appears to be some purpose for us Homo sapiens here. This noble philosophical work shares some concerns and intentions with Thomas Bery's *The Dream of the Earth*: to establish our evolution as part of an historical continuum that started with the Big Bang. Roszak pursues, through available psychological theory and beyond, a concept of psyche that bears some integral relationship to the living whale. The genius of the book is Roszak's belief in human

goodness, a faith he's proclaimed since *The Making of a Counterculture*.

Why is this work important to the ecological activist? Because how we think about ourselves determines our thinking about the world, and thought errors about the nature of the universe or righteous misanthropy might do not just us, but our little home here in the Milky Way, in. *The Voice of the Earth* is about learning a suitable, authentic basis for our endeavor — it's a learned, rational case for honoring the Creative Mystery that enfolds us. —Stephanie Mills

■ There is a bright spirit waiting to be found in each of us, a true self that needs the optimistic trust and freedom that neither social respectability nor conscience-driven politics will give it.

● However closely one may feel that a computer and a living thing resemble one another, there are plaguing differences, among them one of the classic holistic observations. A machine, including the computer, can be taken apart and put back together losing nothing in the process. Not so an organism. Take it apart and something special happens. It dies. Interrupt its vital processes for any length of time by pulling it to pieces and it loses something

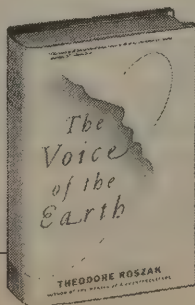
that must have been there hidden away in the relationship between the parts and which cannot be restored. Lived time is radically different from clock time. Living things are systems to which history is indispensable.

This distinction shows up nowhere so markedly as in the faculty that is frequently and casually associated with the computer: memory. Insofar as machines have "memories," they function very differently from memory in the organic realm. Organic memory is a record of experience, an intricate, highly selective blending of emotion, sensuous stimulation, existential crisis. In plants and animals, the experience may be that collective embodiment of evolutionary history we refer to as instinct. At the human level, it is connected with the psyche, a true mind that grows from a personal as well as an evolutionary history. This in turn connects with another great difference between organic and mechanical systems, one that also has to do with time. In the history of the universe, organic systems precede mechanical systems. No machine existed until a human being made one upon this planet. And as yet, no human being has succeeded in making a machine that matches the complexity of our own mind or body. This is why the mechanistic hypothesis has always been deeply flawed; it has chosen the lesser system as a model of the more complex.

### The Voice of the Earth

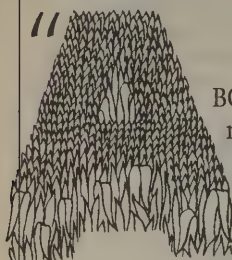
Theodore Roszak, 1992 (Summit Books); 367 pp.

**\$23** (\$26 postpaid) from Simon & Schuster/Order Dept., 200 Old Tappan Road, Old Tappan, NJ 07675; 800/223-2336 (or Whole Earth Access)



# GrassScaping

BY MALCOLM WELLS



"ABOUT TIME TO mow your lawn, isn't it?"

"Looks as if your grass'll need trimming

pretty soon."

"What is this, the jungle entrance?"

Visitors to my house, seeing for the first time the tall, unmowed grass on all sides, divulge more than they suspect about their mental landscapes when they make their friendly wisecracks. Trained from birth to expect either trim lawns or totally wooded settings around Cape Cod houses, they feel uneasy among the free-growing stalks, and feel they must say something to cover their feelings. Later, finding that the landscape was intentional, they admit that it makes sense. Still, it takes many repeat visits before they see the incredible grace and beauty of the plants.

That anyone recognizes the plants

as common lawn grass is a wonder. Most people, on being asked to identify them, will usually make weed-related guesses, or say "some kind of wild grass," seldom dreaming that the seed-bearing spears arching chest-high are the very plants that give us lawns.

When my wife and I bought our house we spent a couple of years un-bungalowing it, adding cantilevered roofs to shelter its entrances, and echoing the roof design in a free-standing shelter above the stair that goes down to the driveway.

How to handle that two-story outdoor stairway was the question. Every kind of conventional stair was simply too hard-looking, too land-dominating, for us. We wanted the *site* to dominate. We wanted a stair that would appear to grow right out of the hillside, so we poured wide concrete steps with plant-slots between them, and let the steep banks spill down naturally over the ends of the treads.

Then we scattered grass seed, planted a few bulbs, and stood back.

We'd hoped that free-growing grass would look nice, but we hadn't quite realized just how nice it would be. From the intensely green blades of early spring

through the tall, seed-bearing fronds of July to the dried stalks of autumn, the grass puts on a dazzling show every year.

A decade or two from now, if we don't discourage it (and we won't), the surrounding forest will have moved in and taken over the stairsides. But it will be a long, long time before the last blade of grass surrenders to the trees. During its tenure here it will have stabilized the banks and stirred us with its beauty, winter and summer, needing no watering, no fertilizers, no pesticides, and of course no mowing. And, instead of shedding a cascade of water each time it rained, the steps themselves will have slowed and absorbed much of the downpour.

When I see how well the stair performs I think that maybe I've finally done something right for a change. ☘



*Most neighborhoods look like parking lots for houses. Architect Malcolm Wells would like them to look more like what was there first. Rather than build on the land, Malcolm incorporates his structures into the landscape. A neighborhood designed by him would be hard to see, but it sure would be nice to live in. In addition to other duties, he and his wife, Karen, fill and maintain The Underground Art Gallery in Brewster, Massachusetts. — J. Baldwin*

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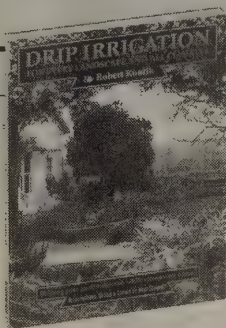
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### Drip Irrigation

(For Every Landscape and All Climates)

Robert Kourik, 1992; 112 pp.

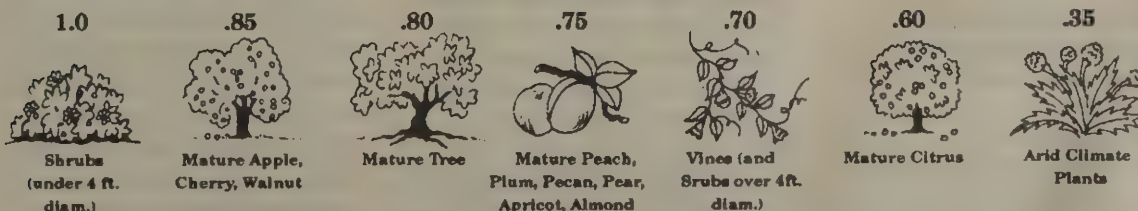
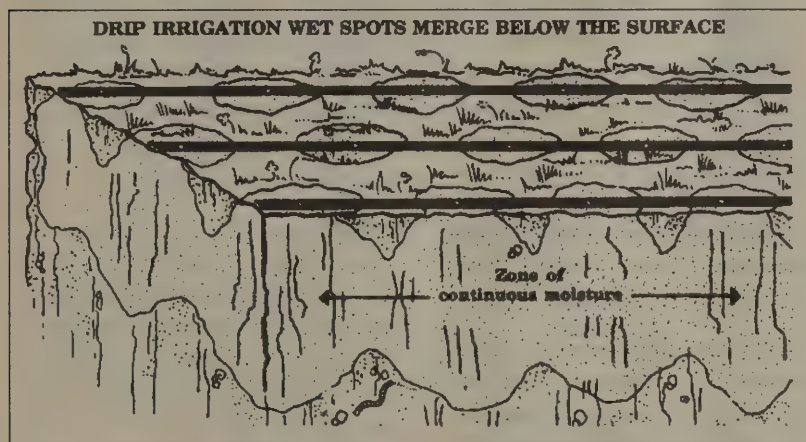
\$12 (\$16 postpaid) from The Irrigation Book Project, P. O. Box 1841, Santa Rosa, CA 94502 (or Whole Earth Access)

### Basic Drip Irrigation Stuff

To paraphrase comedian George Carlin, "People love their 'stuff.' The more 'stuff' the better. But where are they gonna put all their 'stuff?'" Well, drip irrigation can add a lot more "stuff" to your yard. A poorly designed system can clutter your garden with cheap, breakable "stuff." A well-designed system keeps clutter to a minimum by maximizing the effectiveness of whatever bits and pieces you do wind up with and by hiding much of the system with an attractive mulch.

So, under the heading of absolutely necessary "stuff" for a good basic drip irrigation system are a *backflow preventer* to keep water in the hosing from siphoning back into your home's pipes; a *fine-mesh filter* so the small orifices in the emitters don't clog; a *pressure regulator* to keep the easily assembled fittings from blowing apart; and carefully placed lengths of small-diameter black hosing with emitters to control the flow of water. Important "stuff," but not too much, and all easily hidden or disguised.

The wet spots beneath each in-line emitter merge to form one continuous zone of moisture. The soil for the entire length of the in-line tubing is moist some 4 to 6 inches beneath the surface, depending upon the soil type. Sandier soils require tubing with the emitters pre-installed 12 inches apart, while heavier, clayey soils need emitters only every 18 or 24 inches.



Not all plants have truly identical evapotranspiration (ET) rates. Some plants are more moisture-conserving than others. This chart lists the ET-rate efficiency of a number of plants and trees.

# Kill More Trees;

# As Fast As Possible



Photos and charts by Philip A. Rutter

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BY PHILIP A. RUTTER

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*The Rutters have been friends of mine since the sixties. They stayed with the biology that I wandered away from, and have been doing one thing very well. Here's a report from their Badgersett Research Farm, a grand family project just coming into the public eye. They've received grants for demonstration plantings of hazelnut windbreaks in Michigan and for hand-harvestable hazels and chestnuts in Hubei, one of the most sophisticated agricultural provinces in China; their chestnuts are among the trees in Biosphere II. —Hank Roberts*



IMAGINE THE FIELDS of the Cornbelt in July — one organism basically — corn, plus a few bacteria and a nematode or two. A few others use the fields for food — crows, deer, coon — but nothing lives there. It is an unquestioned and unexamined absolute of policymakers: the best lands are reserved for agriculture. Period. We certainly aren't going to change that policy; one cannot suggest that "crop lands" be diverted for any uses or needs other than food production.

What we need is a way to make food production "planet-friendly." Woody agriculture may be a start.

The ultimate limit to any agricultural system is how much sun can be captured. Woody plants capture more sun, and are more efficient, than annual crops in temperate climates. Woody crops' actual measured efficiency is over three times more carbon fixed per field per year than that of a single crop of corn.

Current agricultural practices have been inherited almost intact from our ancestors, whose mobility led them to favor grasses (rye, oats,

wheat, corn) that could be carried and replanted wherever a tribe found itself in the springtime. With this reliable source of staple crops assured, horticultural research has concentrated on developing trees as sources of perishable fruits.

We at Badgersett Farm feel that a basic change in philosophy is necessary, moving away from the searching of natural forests for interesting trees, and turning to intensive breeding with the specific intent of altering wild trees, which basically have no reason to produce large, regular crops for human use, into genuinely domesticated plants.



(Opposite) The genetic diversity of chestnuts offers many variations. From these, commercial varieties suitable for different agricultural systems can be selected and bred.

*I have no desire to be categorized as a missionary of anything, except maybe logic. If one of the crop systems we are proposing makes economic sense, then farmers should try it.*

We want to develop woody perennial plants for tree crops with commercial potential, initially as luxury crops and eventually as staples. We also intend to have demonstration plantings of working commercial cropping procedures at Badgersett. We have begun to make real the potential of such species to become producers of staples, and we are ready to go head-to-head against corn and soybeans as commercial field crops in the market.

Our intention is to conduct "real-world" research, which means that in all respects, the crop systems must have an honest chance of being useful on a large scale, without requiring the world to change its religion, politics, socioeconomic structure, or eating habits. Feed them first (or save their soil first), then maybe they can listen and see. I have no desire to be categorized as a missionary of anything, except maybe logic. If one of the crop systems we are proposing makes economic sense, then farmers should try it. Not otherwise.

The primary reason for seeking such production of staples is our desire to provide viable alternatives to the current agricultural practices, which require extensive tilling of the soil. Tilling soil kills not only macroorganisms, but hugely simplifies the soil microbiota. Imagine the fields of the Cornbelt in July; now imagine the same fields a vast, permanent thicket, habitat (as our hazel bushes are now) for myriad organisms: salamanders, tree frogs, warblers, bluebirds, weasels, jumping mice, shrews, mushrooms, wildflowers, spiders, beetles, snakes, millipedes — absolutely everything.

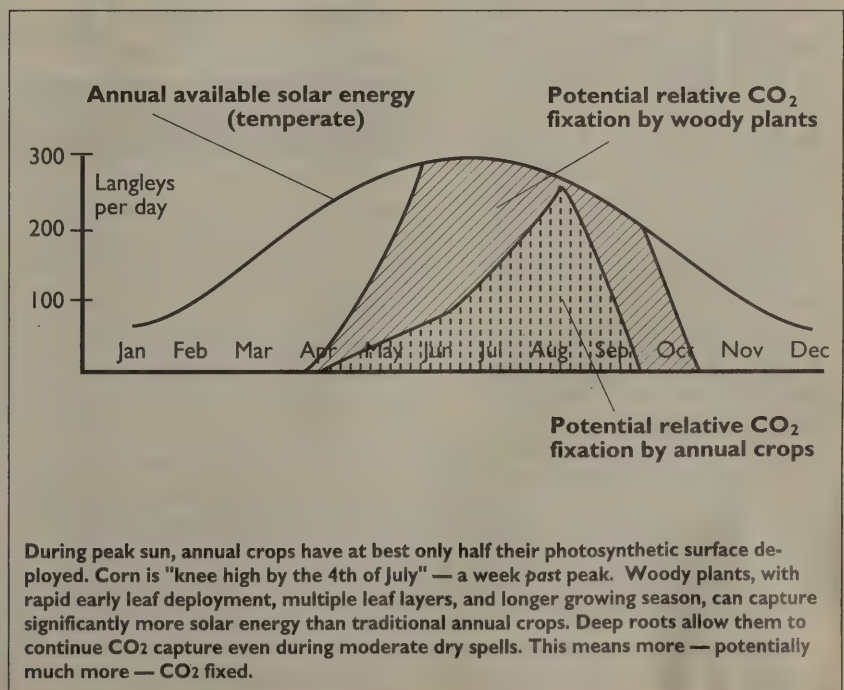
We need to emphasize that the more advanced possibilities are not present realities; although we have demonstrated the potential, the large-scale commercial infrastructure is not yet worked out. If you want to plant 200 acres of machine-harvestable hazelnuts, you can't do it yet, although we hope you'll be able to in five or six years. If you want to plant one to ten acres of pick-your-own bush hazels or chestnuts, that you can do right now.

The real hope for improving the environment rests with the ability to make these crops available to the large-scale machine-oriented growers (in the First World countries); they are the ones using the large tracts of farmland that stay bare through the winters.

### BADGERSETT RESEARCH FARM

Badgersett is a 160-acre Minnesota family farm with ninety acres of conventional corn and alfalfa contour strips, five acres of Christmas trees, and ten acres of experimental nut plantings.

Badgersett is my wife Mary's and my farm. We have lived on and managed it for seventeen years. Row crops are handled by a renter; all tree crops have been planted and developed by us. The nuts are hybrid hazels and hybrid chestnuts, first planted in 1980 at extremely high density. Extensive data collection began in 1985. The farm is intended to function as a private, independent, horticultural research station, with several specific goals in mind, both long-range and



*One thing is quite clear: "intuitive" ideas about how to breed are very often proven incorrect.*

immediate. While we expect that the hazels may become economically productive more quickly than the chestnuts, the chestnuts have a greater long-range potential because of their basic biology; they seem to have a unique physiology, and their unusual characteristics seem to lend themselves to the possibility of domestication.

Many farmers are eager to find alternatives to corn and soybeans, and would prefer crops that are not so hard on the soil, but economically realistic options are currently rather limited. It is our hope to gradually introduce people to the more unusual crops and ideas here through the sale of the standard crops of Christmas trees and cider. We have an orchard coming on, which consists solely of cider apples, and we eventually will have hazels and chestnuts for sale as byproducts of the initial start-up plantings. Our scenario has folks coming to get their tree and cider; we will then hand out samples of roasted chestnuts (there is little tradition for them here), and perhaps cookies made with hazelnuts. With luck, folks will find the food attractive, and buy some to take home. If we can show our farmer customers that we are making money at this, they will quickly begin to consider planting chestnuts or hazels themselves. The international market is well established for both.

We recognize that this is a very ambitious goal. In such a situation, it is best to find out what others have accomplished and to build on past labors.

Where we live in Minnesota, hazels were in fact one of the dominant plants before the arrival of agricul-

ture; they are a natural choice to investigate for crop potential. Carl Weschcke, who had a planting of many kinds of trees at River Falls, Wisconsin, left behind him not only the trees (now neglected) but also a book outlining his experiences and opinions. His conclusion was that hybrid hazels and chestnuts might be the most promising trees for this region, and we started with those trees. We still agree, after having delved into the possibilities further.

The science of genetics, and the understanding of how best to select and breed for complex traits and combinations of traits, have progressed mightily in the past few decades. One thing is quite clear: "intuitive" ideas about how to breed are very often proven incorrect. If we are to hope for real progress in our goal of domestication, we have to use the best tools available. Serious science outside the university is what we are trying to do; we are convinced it is possible. The operation at Badgersett is really only made possible by the advent of the small computer. With a much smaller amount of help than used to be necessary, we can keep track of many more things than ever before imaginable. Because we are growing many trees, it is relatively easy for us to do everything with "controls" — i.e., according to scientific method. Not knowing is the most expensive course of action. Whenever we can, even if it means more work, we try to make and care for the plantings in more than one way, and always with the essential controls.

We keep track of as much information about each tree as we can, to

enable us to make culling decisions on a sound basis. This is a chore the computer makes possible; it gives us the ability to compare many trees by many characteristics, and to make judgments about which trees are superior. In the case of the chestnuts, we keep track of about fifteen different traits each year: specific aspects of vegetative health or bearing characteristics, for each tree over three years old. The result is a detailed portrait of each tree, year by year. When a row is getting crowded, we can make a decision about how much to thin it and, using the computer, identify (say) the worst 40 percent. Those trees are then culled, the better trees continue to grow, until the next time the row is too crowded, when the computer will be used to look at several more years' performance of each tree, making thousands of comparisons, and again identify the poorer trees for culling.

No farmer should make extensive plantings of tree crops without such demonstrations. As soon as possible, we want to have small-scale working commercial plantings. Our goal remains primarily research, but the research will be pointless unless put to use.

If we simply grow everything that is interesting, we will probably not be able to make much real progress on anything. Although we are concentrating on the hazels and chestnuts, we have succumbed to the temptation of other species, and have a few pecans and some hickories. The priorities remain, however: the hazels and chestnuts get cared for first, and other plantings may have to fend for themselves.

We attempt to search for desirable trees and traits by screening as many seedlings as possible. Our breeding strategy here is called "mass selection." Mass selection can be a useful technique for working with genetically complex traits, but to be effective it requires large numbers of seedlings. "Hundreds" may be too few, and "thousands" barely ade-

quate. This means we must plant as many seedlings as we can care for, grow them just long enough to begin to tell the good ones from the bad ones, and then get rid of the bad ones. Our official motto is: Kill more trees; as fast as possible.

This is an absolutely necessary doctrine for the improvement of tree crops. If a grower should plant ten trees, watch them grow, and pick the best one to develop, that one tree is nowhere near as valuable as it could have been if he had planted a thou-

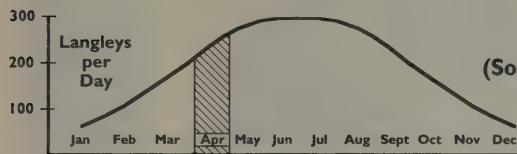
sand seedlings in the same space, and killed all but the ten best of them in the first five years, and then watched the remaining ten trees.

It is clear that we must identify the poorer trees as rapidly as possible, and remove them, and use their space and the time their further care and observation would have required to plant more trees. We don't want to be blind enthusiasts, and don't want to encourage that in others; history is full of pigheaded, destructive enthusiasts. We want everybody to look at the possibilities with both eyes open.

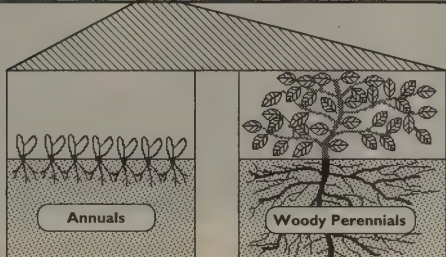
In general, test plantings are made with machine-planted, bare root stock, to allow us to handle more trees. They are planted at very close spacings, usually in double rows that make it easy to compare many young trees rapidly; any trees with extraordinary characteristics stand out all the better for this close juxtaposition. The close spacing also means the trees become badly crowded rather quickly. This is intentional, and is designed to counterbalance the very human desire to see each little tree thrive.

There is a very strong emotional tendency to maintain mediocre trees for years, in the hope that they will suddenly begin to show highly desirable traits. We know it is a long shot, but when one has found or made the seed, weeded the seedling in a seedbed, protected it from rodents, transplanted it, watered, watched, re-weeded, and fertilized it for several years, one naturally becomes attached to it. In the crowded planting, it becomes easier to cull a mediocre or borderline tree. When we see an unquestionably superior tree struggling for space with several undistinguished neighbors, the desire to help the better tree out makes it much easier to get out the saw.

This kind of culling scheme will result in initial selection for vegetative health and vigor, and/or precocious bearing, as culling must begin before all the seedlings start to bear. We think that healthy trees will be more

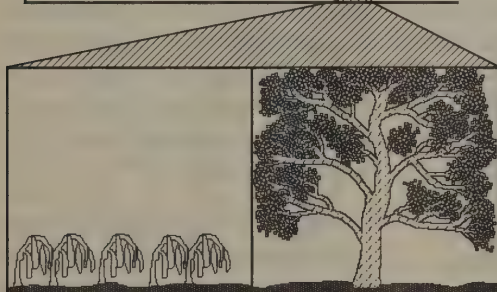
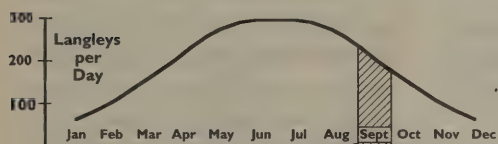


(Solar radiation 40° North)



Early in spring, annuals have meager photosynthetic capability. Shallow roots are susceptible to even slight drought.

Woody perennials rapidly leaf out, efficiently capturing strong spring sunlight. Deep roots consistently supply water.



Early in autumn, annuals produce seed, then die while sun is still strong.

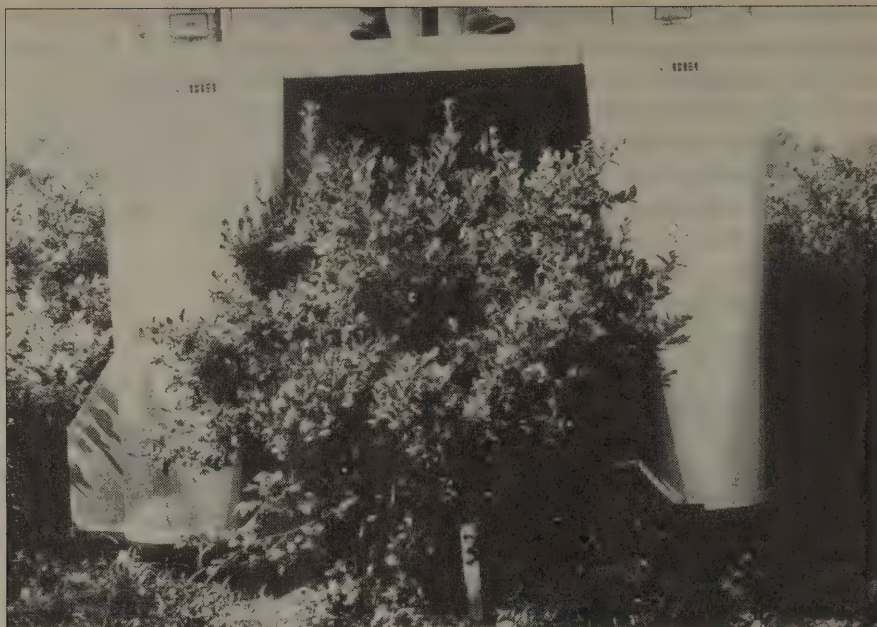
Woody plants continue to photosynthesize, storing carbohydrate in seed and in roots for future growth.

## From CO<sub>2</sub> to Nuts

Annual crops do not really store carbon; most of the CO<sub>2</sub> they fix will be back in the air in a few months. Wild trees store carbon for a long time, in trunks and roots. If the balance of the system required releasing this carbon (i.e., cutting the trees), the fruiting ability of regular trees would be lost for years. With woody-agriculture-style plantings, however, the carbon sink could be cut and burned or composted to release the CO<sub>2</sub> at any time, and the cut plants would begin producing food again in 18 months. Or (since

they are bushes) half of each bush could be cut, leaving the other half functional and productive. Or, if the carbon should remain bound, the bushes can remain uncut for years. Present estimates of the annual increase in atmospheric carbon are around three gigatons; if woody plants could be substituted for the traditional annual crops now being grown on one-quarter of the world's croplands, they would fix an additional five gigatons of carbon per year, with no decrease in food production.

Machines like this one are used to harvest bush crops such as blueberries. Here, a harvester rolls along straddling a row of coppiced nut trees. As each tree is engulfed, vibrating arms shake the nuts off the branches into collecting bins.



likely to have good nut and bearing characteristics than weak trees.

### SPEEDING THE PROCESS

Precocious plants bear flowers and fruit at an unusually young age. We have been working to elucidate the genetics of precocity, and to create such individuals intentionally rather than by chance.

The one precocious chestnut seedling we have observed from our own controlled pollinations was the result of crossing two moderately precocious trees (both bore flowers in their third growing season). The one resulting nut was planted in a pot, and outplanted to a permanent location when it was three months old, whereupon it bore several male flowers, at the ripe old age of four months. In its next growing season, it bore both male and female flowers.

So far these extremely precocious trees are not well adapted to the burden of flowering at an early age. They grow very slowly in their first years, and their inflorescences are often deformed or atypical. They have no reserves to be used for nut production, and the presence of flowers (an adult phenomenon) could be expected to cause some hormonal im-

balances in a plant that needs to put its energy into root and top growth, not flowering. With the creation of a population of such trees, however, some individuals may be expected to appear that will retain the precocity, but will also be more vegetatively vigorous. We hope in time to achieve a strain that both grows strongly and flowers immediately on germination of the seed.

We do not foresee such plants as being useful in orchards, but they would be very useful as breeding tools. One of the greatest barriers to tree improvement is generation time. We can start with a precocious tree that is known to throw productive offspring (having grandchildren is one definition of genetic fitness). Crossing should result in progeny with the extreme precocity trait fully expressed; they should all flower immediately after germination. If pollen from such seedlings were used to fertilize flowers on an older tree capable of producing nuts, the generation time for crosses could be reduced to one year. While it would often not be possible to screen such seedlings for the presence of desired traits, the use of parents with known genetics would make it possible to make

crosses "blind," knowing that the characteristics sought are present, even if unseen. This could create the very real possibility of being able to breed chestnut trees on the same basis as annual crops, and would bring within reach much more complicated breeding projects requiring many generations, possibilities never even considered today.

Besides the work on extreme precocity, we have a number of experiments in progress in our chestnut plantings. In addition to fertilizer experiments, we are measuring the later performance of plants that were large, medium, or small after two years in the seedbed, watching the effect of early pruning on age of bearing, and evaluating the effect of coppicing on the growth form of trees intended for orchard use. For several years we ran controlled experiments on various deer repellents. We also keep track of a number of smaller observations on orchard establishment, care, and maintenance.

### SOME REMAINING OBSTACLES

*Propagation:* If you are going to plant zillions of acres, you need hundreds of zillions of plants. Nuts have one big problem as seeds: they are a great

big tasty chunk of food, worth serious effort on the part of birds and mammals to search out and dig up. And they do. We also need to have good production of uniform clones for the machinable systems; machines have to have uniform conditions in order to work. Tissue culture offers its immense promise of all the plants we can use, cheap, but the start-up costs are high. There are answers for all this, but they take time to implement.

*Weeds:* Both chestnuts and hazels will shade out most of the usual weeds, once they are established, but a new kind of weed, not a problem in cornfields or orchards, develops: the woody weed. Birds use the bushes and trees of woody agriculture plantings extensively, and drop all kinds of weed seeds. At Badgersett, the list so far includes grape, wild cherry, box elder, elder, prickly ash, and raspberry. These are not a problem in cultivated fields, because they are plowed up; not a problem in orchards, because the land between trees is open, and mowed or cultivated. In woody ag plantings, though, the bushes/trees can be so tightly packed that woody weeds can get well established in between them before you know it. Then getting rid of them can be a chore. Multiply twenty years of bird droppings times 200 acres. That's a lot of cherry and raspberry and grape seed. It may be that hand labor will be needed to periodically clean them out; that's what we're doing now.

*Pollination:* Turns out to be a factor that needs forethought. Both chestnuts and hazels require a genetically different tree nearby for pollination, and both have special needs. Chestnuts are rather weak pollinators (don't produce much, and it doesn't travel far from the tree); in order to get a good crop, you need a big pollen-producing tree nearby, which means if you plant acres of uniform, young trees, there is likely to be a period when the trees could be producing more, but aren't, because of inadequate pollen. Hazels are strong

pollinators (lots of pollen, travels well), but they are likely to have incompatibility problems (they're fussier about sexual partners than chestnuts), which will require paying knowledgeable attention to the mix of cultivars in your planting. And we've found that deer will eat the male catkins voraciously just before they shed pollen. For several years, we have seen tons of males on the hazel bushes, up until they start to expand in the spring. Then, in a few days, all the catkins below four feet, all the way into the middle of the bushes, disappear. If you have lots of deer and a planting of only a few acres, this may mean that although your bushes are old enough to be producing a crop, and have lots of female flowers, they may not get pollinated until the bushes are well over four feet tall. This shouldn't be a problem in really big plantings; the deer couldn't eat all the catkins on twenty acres, for example (I think).

*Pests:* Another unknown is the possible buildup of diseases or insects over the long run, when the ground is not tilled. It may be that since the system is less perturbed, natural antagonists of the pests may build up stable populations, and better control the unwanted critters; then again, it may not. We haven't been doing this long enough to really know — only twelve years. (I can tell you, though, that the hazels are full of spiders, ladybugs, lacewings, and assassin bugs, all highly desirable insect predators.) Also, it looks like when we cut the hazel bushes to the ground for renewal, they lose a lot of chronic disease in the old wood; the new shoots are tremendously vigorous, dark green and healthy looking, and they stay that way for several years. (We still have lots to learn here. I can guarantee the readers that Murphy and his laws will show up sooner or later. Still, there is no reason problems here should be greater than in other crops.)

*Vertebrates:* In tilled fields, there is no stable habitat for birds or mammals.

They may use the fields a little, but cannot live there; so the larger the field, the fewer vertebrate crop thieves. In woody agriculture fields, however, all kinds of vertebrates can make themselves at home, permanently. This will sound great to critter sympathizers, myself among them, but it could spell trouble for the crop. Mice eat a lot of hazelnuts before they are ripe, and so do bluejays, crows, etc. Most of the theft is not outright eating, but the storing of food for later. The effect on regional vertebrate populations of square miles of woody agriculture plantings remains to be seen, but it might wind up that we would be growing a lot of food for the animals, and not harvesting much of it ourselves. My guess is that this will not happen; animal predators and space requirements should serve to keep nut-thief populations in check, most of the time. Anyway, it would be a better problem to have than limiting herbicide runoff, losing soil, depleting aquifers, and loss of biological diversity from critters having no place to live. ☺

## Information

... is available from:  
Badgersett Research Farm  
RR 1/Box 141, Canton, MN 55922  
507/743-8570

Badgersett sells hazelnut and chestnut seeds; information on how to grow the seeds is sent with seed orders, or is available separately for \$2.00.

*Badgernews*, our occasional newsletter, costs \$3 (a one-time fee).

## Suggested Reading

J. Russel Smith's *Tree Crops* (WER #64, p. 37).

Annual reports of the Northern Nut Growers Association can be found in a good university library.

Northern Nut Growers Association:  
9870 S. Palmer Road, New Carlisle,  
Ohio 45344.

## Used Cars • Lease Cars

Willingly or un-, most of us use a car or truck; might as well buy smart. Judging by my mailbag, a number of WER readers have saved a bundle by using this author's previous book, *The Car Buyer's Art*, to advantage. It has served me well, too. That book applied to new cars; this one is specifically for buying used cars. It's a whole different game, one you had better know before play commences. As was its predecessor, this book is actually a script for a play in which you and your sidekick are actors who assault a dealership and win. It works.

Mr. Parrish also has a similar book on how to lease a car. Until recently, leasing was not a sensible option for most of us everyday folk; now that dealers are hungrier, it may be. His explanation of tricky leasing jargon and procedures makes it easy to understand the suggested savvy tactics. I'll bet they work, too.  
—J. Baldwin

The Director cleared his throat and looked up from his notes. "What you say makes sense. But how can you expect to buy a cream puff from a new car dealer at below wholesale price? They'd never go for that." "Sure they would," Andy answered, "because they stole the equity from the previous owner."

"Stole?" the Writer asked.

"Sure. Say a car is worth \$7,000 wholesale. Its owner wants to trade it in on a new car, and they give him only \$5,000. They have, in effect, stolen \$2,000 from him."

Joan continued the thought. "Then what we do is buy that car from the dealer at about \$6,000. We got it below the wholesale price of \$7,000 and the dealer makes \$1,000 profit."



Naturally, the Writer had seen the tragedy in all this: "The only loser was the guy who traded it in."

Andy nodded gravely, then continued. "Car salesmen literally steal the remaining equity dollars in your trade-in. They do this by convincing you it is worth a fraction of its real value. This is a dirty trick that costs you thousands of your hard-earned dollars."

BOB: Listen, I think we could actually let this one go from about \$12,000. Interested?

Joan has noticed Bob checking the "bumper code." She strolls over and reads it herself. The bumper code is a small sticker on the bumper or lower corner of the windshield which gives the dealer's price for the car in a code that only the salesman can read. Often, this code is the price, backwards, inserted between the two numbers of the car's year. For example, say the code on a '89 Ford Escort was 3338759333. All the

3's are meaningless. The 89 is separated by 75 — read backwards this is the car's price in hundreds: \$5,700. —Used Cars

When Leasing Makes Sense  
D.A.: So when does leasing make sense?

WRITER: Well, take the Director here, he needs to look "upscale," right? To fit in with his Hollywood image.

DIRECTOR: Can't we use someone else for an example?

WRITER: Okay, take a real estate agent. They need to drive people around in comfort. So they always need a new car. Car payments are a necessary evil for them. At the end of their lease, they trade in and begin the cycle again. Leasing cuts their cost three ways:

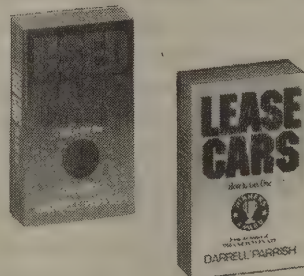
The Writer sketches the reasons out on his note pad:

1. No down payment — saving \$2,000-\$4,000.
2. Reduced monthly payments — usually \$100 to \$200 a month less.
3. Increased tax deduction.



Let the salesman switch you to leasing. When you act concerned about monthly payments, the salesman will probably offer to lease the car to you. By letting the salesman switch you to leasing, it makes him think he is making progress in the deal and increasing his profit — without costing you a penny more! This deception will also make the salesman believe you know nothing about leasing, and won't challenge his figures.

Always be ready to "walk." This is a golden rule for negotiating any deal — and the highest card you can hold. Don't become so attached to any car that you can't walk away from it. You can always start over again at the next source in your stack of cue cards. —Lease Cars



**Used Cars**  
(How to Buy One)  
Darrell Parrish, 1991; 204 pp.  
**\$5.95**

**Lease Cars**  
(How to Get One)  
Darrell Parrish, 1992; 260 pp.  
**\$6.95**

Both postpaid from Book Express,  
P. O. Box 1249, Bellflower, CA 90706

## Mountain Bike!

With wicked wit and a gnarly cartoon style appropriate to the subject, William Nealy instructs mountain bikers of all sizes and genders in techniques that maximize the joy while minimizing the undesirable consequences of ineptitude on both rider and environment. This is the one that'll get read. —J. Baldwin

### Mountain Bike!

(A Manual of Beginning to Advanced Technique)

William Nealy,  
1992; 163 pp.

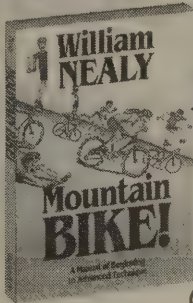
**\$12.95** (\$15.45

postpaid) from Velo

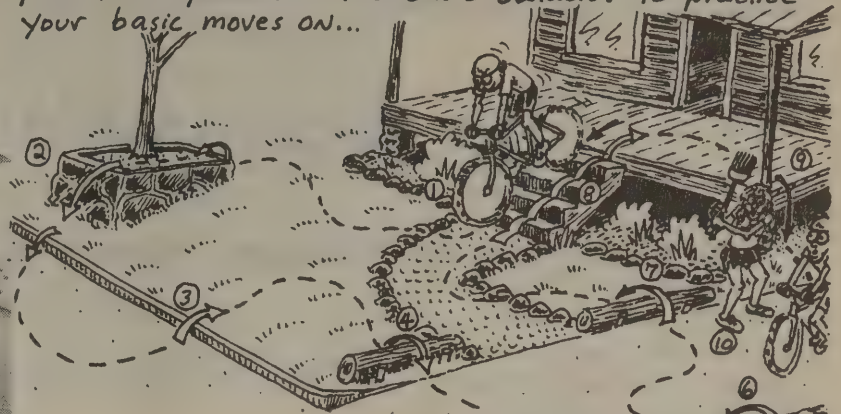
News Books, 1830

N. 55th Street, Boulder,

CO 80301; 800/234-8356



You probably don't have to look much farther than your front yard for the basic obstacles to practice your basic moves on...



① Down the steps - ("Trail Equivalent" or "T.E." - rocky stairsteps)

② Off the planter & curb - ("T.E." - medium height multi-drop-off)

③ Up & over the curb (T.E. - log hop/ledge hop)

④ Over a landscaping timber (T.E. - log hop)

⑤ Up the curb into garden (T.E. - ascending rocky stairsteps)

⑥ Over the garden wall into driveway (T.E. - going off a medium drop-off)

⑦ Over the landscaping timber (T.E. - log hop)

⑧ Up the steps (T.E. - Ascending a large rockpile)

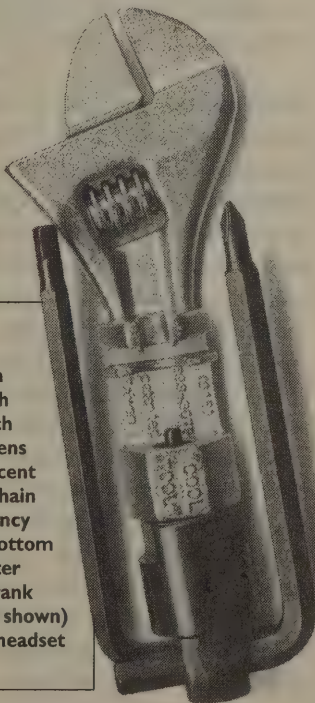
⑨ Off the porch (T.E. - going off a big ledge)

⑩ Whacked in the face by an angry spouse or spousal equivalent. (T.E. : encountering an extremely hostile landowner or intractable ranger, T.E.<sup>2</sup> : having a really bad crash!)

## Cool Tool

It's 4 and 7/8 inches long and less than half a very ingenious pound. The tidy (optional) carrying case also accommodates a tire-patch kit. Add your pump, and you should be able to take care of just about any on-the-road bicycle trauma short of complete disintegration. It's what I and many other bikers carry. —J. Baldwin

[Suggested by Mike Sutherland]



- tire tool
- # 1 phillips
- cone wrench
- pedal wrench
- spoke wrench
- 4-5-6mm allens
- narrow crescent
- hyperglide chain tool
- emergency crank bolt
- bottom bracket adapter
- cotterless crank wrench
- (not shown) 32-36-40mm headset adapters

### Cool Tool

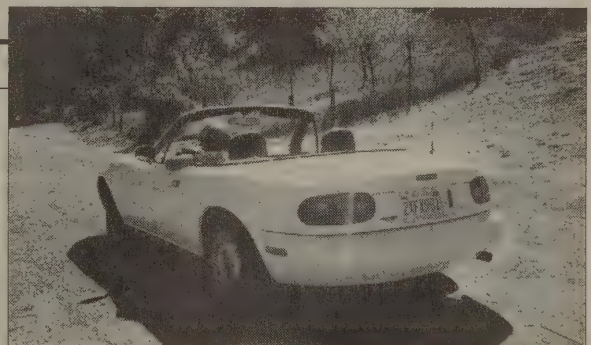
About **\$25** at bike shops; information from Cool Tool, 13524 Autumn Lane, Chico, CA 95926

## Road Rash

We live way out in the countryside, far from any public transit, on a narrow truck-route that is dangerous for bicycles. Liz and I work 50 miles apart and have different schedules.

My car is a compact family station wagon. Hers is a Miata. White. It gets 40 miles per gallon and is one of the better cars made. With good handling, an airbag, and four-wheel disc brakes, it's pretty safe; our insurance didn't go up. She paid about what you would for a Honda Civic of similar specification, if not panache.

But you should hear hardline environmentalists tsk-tsk, and see their raised eyebrows, and feel the credibility drop



Liz Fial

when Mr. Whole Earth Technology Editor rides it to town, even though the flying soapcake is Greener than most of their cars. Those people act as if it is somehow sinful to even look like you enjoy driving. I keep hoping that this is not a harbinger of an eco-fascist jihad, but I bet it is. Or maybe they're just jealous. Either way, we'll just put this here top down, and you can all eat your livers. —J. Baldwin and Liz Fial



# The Assayer's Scale

## Was Intelligence the Ultimate Currency of the Information Age?

BY RENEE FULLER, Ph.D.

We got a tantalizing taste of the work of Dr. Renee Fuller in WER #64 (p. 126) and wanted more. As a practicing physiological psychologist, she discovered that people act as if their brains are built to organize information not in bits, but in terms of "stories" — someone or something acting or being acted upon. She calls the basic cognitive unit the "story engram."

*Story engrams incorporate and organize many bits, giving them a context that facilitates recall. Fuller has found that people learn to read, write, and organize their thoughts much more easily by means of engrams than by the usual methods of learning alphabet, words, and sounds without context. Because her methods are attuned to the way we naturally use our minds, just about anyone can learn to read, including many considered to be hopelessly unable. Her discoveries have important implications for all teaching and learning.*  
—J. Baldwin

PETER WAS ONLY SEVEN when he swaggered into my office like a pint-sized Texas billionaire. Even without asking I knew the reason for the swagger. His parents had told me — Peter had tested in the genius range on the IQ test his school had requested. And Peter had understood the meaning of his high IQ score. He was in possession of the ultimate property of our information age, a high IQ.

We humans have always liked to own things. Possessions give us importance, status and identity. During feudal times, land had become so defining a possession that even a person's name was frequently linked to it. Then, with industrialization, there occurred the first of three major shifts as capital, also known by the more mundane name of money, became the property that conferred importance, status and identity. Continued advances in industrialization were led, at the end of the last century, by knowledge-information applications; the definitive possession, which had shifted from land to money, shifted once again — this time from money to knowledge-information. Status, importance, and identity began to be defined by information expertise. The knowledge-information purveyors became the important people of this new society. But contrary to land and money — which, being tangible possessions, are easily

quantified — how was knowledge-information to be quantified?

The answer was: test for it. Enter the various mental tests, including the IQ test. But the IQ test developed into something more than a measure of how much a person knows. It became a predictive test, attempting to determine how much knowledge-information a person is capable of acquiring in the future. The test, with its intelligence quotient (IQ), created a concept new to this century, one that reflects the reality that knowledge-information has become the defining property. Now, during elementary school, many of our children are given some form of IQ test. And as Peter had understood, a high score implies that the owner is in potentially ample possession of the ultimate property. He/she is a potential purveyor of information. The admiration and envy with which we treat such people are similar to the treat-





**There is an inevitability about the way the human brain forms story engrams that explains not only the universality of grammar, but also the speed with which children normally learn language.**

ment accorded the moneyed rich of the industrial age, and the land-holders during feudal times.

There is, however, a major difference that makes intelligence the ultimate property. While the loss of land during feudal times, or money during the industrial age, meant the loss of importance, status, and identity, it did not mean you had stopped being "you." But with the loss of knowledge-information, and/or the capacity to acquire it, you cease to be the same person. The capacity to think, and acquire knowledge-information — being located inside us — has an intimacy that surpasses all other possessions. Since IQ tests are the presumed evaluators of this property, they have a high emotional charge. When there are questions about the validity or reliability of IQ tests, emotions run high.

During the fifteen years that my research had required intellectual evaluations of my fellow humans, I had seen firsthand that the tests, when properly administered, are surprisingly good predictors of what a person is able to learn, what information can be acquired, even the thoughts he/she is capable of thinking. IQ tests predicted much more than school performance. They were truly the instruments to measure the defining property, or potential property, of the information age. Was there some satisfaction because I considered myself the proud owner of considerable knowledge-information property? Of course. It's fun to be rich: to have status, importance, and identity, which is why, when some of my staff reported successes that should have been impossible for low-IQ students, I did not believe them. How could I possibly believe that

they had succeeded in teaching reading with comprehension to severely retarded students? Such results run counter to what the IQ tests measure. Besides, the reading program had been designed for learning-disabled adolescents of superior intelligence. Surely my staff, in their eagerness to have even the severely retarded succeed, had seen things that weren't there.

But they were there. And they kept being there, again and again.

It was not only that severely retarded students, and normal four-year-olds, easily learned to read advanced text with comprehension — their significantly increased capacity for knowledge acquisition and their mature language content did not fit modern concepts of intelligence and IQ. Abstract ideas were supposed to be out of reach of the severely retarded and the very young. Such intellectual property belongs to higher mental ages, to higher IQ levels.

We spent the next five years expanding the original study, trying to understand what had happened and why. Instead of providing answers, the results became more and more confounding. The IQ tests that had been such useful tools in my previous research had not only lost their predictive value; they were

not even descriptive of what our students were doing in the present. As a good scientist, I turned the question around and asked, "Is there anyone who fails with this program?" We eventually found two. The two failures, however, were not our lowest-IQ students — quite to the contrary. But they had in common something that turned out to be very rare even among the severely retarded. They were unable to follow a story. Both of these students had almost continuous petit mal seizures. My suspicion was that the repeated electrical discharges prevented long-term memory traces from being established; hence their lack of story organization and story recall. Since story context is an essential component of the reading program, this would explain the two failures.

In the Ball-Stick-Bird program, story reading begins with the presentation of the fourth letter.\* This immediate story immersion makes what I call "code approximation" possible. In code approximation, the inability to achieve fine sound discriminations is used to the advantage of the learning process. Instead of being taught multiple phonic sounds for each letter, which must then be discriminated, the student is given the most usual sound. And he/she is told the truth:

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\* Ball-Stick-Bird simplifies the mechanics of reading by showing how each letter of the alphabet can be made with three basic forms — a circle (ball), a line (stick), and an angle (bird). It also emphasizes the abstract process of comprehension. Word-building begins with the presentation of the second letter. By the time the student knows four letters he is reading stories.



**We had trouble accepting that it was now possible to communicate intellectually with those who had been labeled as severely retarded or culturally deprived.**



that the letters represent a sloppy code requiring a flexible approach. This flexible approach to letter sounds is introduced with: "You are a detective. The letters are your clues. But like all clues you can't be sure of them — until they make a word that makes sense in the story." In the first lesson, the student already uses "code approximation" to decipher the story.

Immediate story immersion also makes possible the innovative use of developmental linguistics and story-ogram layout [see sidebar]. The first two books begin by telling the story primarily with nouns and verbs, which form an elementary story ogram. Adjectives, then adverbs, enrich the story engrams after the first few lessons. The later appearance of articles and prepositions continues the sequence; this resembles the progression through which children learn language (developmental linguistics). Each story ogram (tabloid headlines or political sound bites are good examples of story engrams) appears on a separate line. In this way, the layout shows how the bigger story is built, line by story-ogram line. The two innovations — developmental linguistics and story-ogram layout — were introduced to make story comprehension easier, so that contextual cues could be used in code approximation. They were not supposed to actually teach language and thinking. But that is exactly what they did.

We had noticed that our students, even the severely retarded, started to write or type on their own by the end of Book 3. Using developmental linguistics, they assembled their thoughts by first searching for the noun, then the verb, gradually adding the adjectives and adverbs. That

is how they built their story engrams — the same way the books had done it. Then they gave each story ogram a separate line, mimicking the story-ogram layout. Asked why, one of our retarded students explained: it "help you think." Developmental linguistics inadvertently resulted in implicit learning of how an idea is built. Story-ogram layout, which shows how the bigger story is built, pro-

duced further implicit learning of story and idea elaboration. Our students became living examples that thinking can be taught.

As for their IQ scores, these bore little relation either to their reading performance or their subsequent performance in the outside world. In retrospect, this should not have been a surprise. IQ tests, following the tradition of the original Binet test, measure neither story comprehension nor story building. Instead, they measure isolated skills frequently involved in drill learning, and isolated bits of information — very different from the context-oriented approach of the reading program. IQ tests measure only one component of the knowledge-infor-

### Ball-Stick-Bird Reading

Learning the alphabet is not where it starts; students learn letters by actually constructing them physically from the three simple cutout shapes Dr. Fuller calls ball, stick, and bird (a V). They're all caps so as to reduce discouraging confusion. At the same time, students are taught the most common sound of a letter and words that use it that way. Words begin as the second letter is presented; story engrams begin with the fourth. The lessons last just ten minutes or so. Dr. Fuller emphasizes that "immediate mastery is not required" because all the material is repeated over and over in different contexts.

The series of Ball-Stick-Bird Reading books and their accompanying teacher's manual are available from Ball-Stick-Bird Publications, Inc., Box 592, Stony Brook, NY 11790; 516/331-9164. —J. Baldwin



THIS STICK HITS A BIG BALL STICK TO IT

Sub. in 30th Day



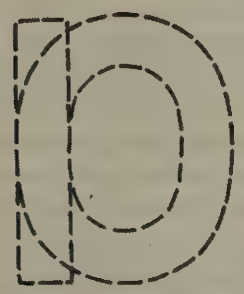
**Developmental linguistics inadvertently resulted in implicit learning of how an idea is built. Our students became living examples that thinking can be taught.**

mation complex, a component that computers handle so well. Even a standard desktop machine, with a dictionary and encyclopedia, has an IQ that far surpasses its human creators. And yet our students with IQs as low as 20, once we had taught them to read with comprehension, exhibited a capacity for knowledge organization that far surpasses the capability of those high-IQ machines. Although it had not been intended to, the reading program teaches how to impose a cognitive structure on bits of chaotic information.

The cognitive structure that our students learned through developmental linguistics and story-agram layout has a long evolutionary history.

Vervet monkeys already have distinctive sounds for different predators (nouns) that require different responses (verbs). This noun-action-verb complex is not dissimilar to the simple story engrams used in the beginnings of Books 1 and 2 of the reading program. There is an inevitability about the way the human brain forms story engrams that explains not only the universality of grammar, but also the speed with

which children normally learn language. It also explains why sound bites and tabloid headlines are so effective; they tap our fundamental unit of cognitive organization. Because this story-agram structure is fundamental to all humans, stories from one language can be translated into other languages. Story organization is so basic to our thought processes that it is difficult to imagine another way of organizing information. Even the aliens in science-fiction stories usually communicate in story form. There are other ways of organizing information, as insects and computers demonstrate; but for us humans, our stories, from creation to perdition, describe a cognitive similarity that makes us one species.



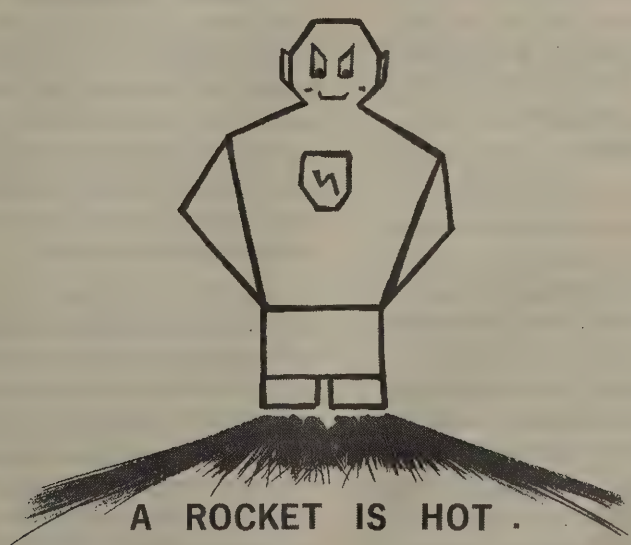
**D**

DOT  
DID  
TOD

IT

**VAD OF MARS**

**HAS ROCKETS FOR FEET .**



**A ROCKET IS HOT .**

**IT IS RED HOT .**

Story engrams represent an extraordinary solution to information overload. By imposing a structure on millions, even billions, of bits of information, their rapid reintegration and retrieval becomes possible. As in the case of the vervet monkeys, there are evolutionary advantages to a cognitive structure with the capacity to draw rapid conclusions. In contrast, our high-IQ computers have dealt with information overload by indexing and categorizing, making encyclopedias of information storage possible. But the machines are incapable of the reintegration and organized retrieval of information that we inadvertently taught our lowest-IQ students.

The understanding of language, cause and effect, meaning, are human cognitive essentials that are out of reach of machines. Though they are the possessors of more information property than any mere human, because their evolutionary development did not take the story-engram form, they lack the most important component of knowledge-information property. Without stories, computers, unlike humans, cannot create meaning.

The difference between human cognition and machine cognition highlights what has happened in our time. A growing split has developed in knowledge-information property. The two components, knowledge and information, have drifted apart. The information component, once stored solely in the human brain, is now stored primarily in machines and books. The knowledge component, on the other hand — built with story engrams that structure the information from the books, the machines,

**Most vehement was the reaction toward those who had been labeled “gifted.”**

**Some teachers took the program away from this group because “it puts an even greater distance between them and the rest of the kids.” And yet at the suggestion that the rest of the kids could also have the program, there was hesitation. One teacher explained, “It makes them too smart.”**

the environment and the senses — continues to be the proud property of the human brain. Could we be experiencing a third major shift in what is considered the defining possession? Will status, importance and identity, rather than being defined by how much information we have stored in our brain, be determined by our ability to integrate and organize information?

Because of its evolutionary history, the human brain organizes input on the basis of context. When this organization occurs on the conscious level, and is therefore linked to language, it takes the story-engram form. Our data show that thinking with the story engram can be taught, and that knowledge and IQ need not be correlated. Since thinking can be taught, a more equal distribution of knowledge property becomes pos-

sible, and the capacity to organize information can be widely shared.

SOMETHING STRANGE happened to those of us involved in the reading program. We had trouble accepting that it was now possible to communicate intellectually with those who had been labeled as severely retarded or culturally deprived. Of course, we wanted our students to succeed, but perhaps not quite that much. In retrospect, my reluctance to share philosophical musings with eager, disadvantaged students about the meaning of life, about how to create a better society, seems hard to comprehend.

Nor were these reactions restricted to the severely retarded, the culturally deprived, or the very young. Most vehement was the reaction toward those who had been labeled “gifted.” Some teachers took the program away from this group because “it puts an even greater distance between them and the rest of the kids.” And yet at the suggestion that the rest of the kids could also have the program, there was hesitation. One teacher explained, “It makes them too smart.”

Gradually I realized that accepting intellectual equality is not easy. Although we were terribly proud of our students, they weren't supposed to be that clever, perhaps even to become our superiors! Greater intellectual ability can be threatening. Teachers and parents, who would literally have given the shirts off their backs to a needy stranger, suddenly lacked emotional generosity. It is not that easy to share intellectual possessions, especially when these possessions are the defining property of the information age.

But we are no longer in the infor-



mation age. We have entered the knowledge age, leaving the information age to the computers. We have been liberated without realizing the full implications of this new freedom. When we built those machines with their high IQs, we liberated ourselves from having to demand that our brains absorb disconnected, boring bits of information. Our high-IQ machines do that for us. At a keystroke they can give us back any information in their arsenal. They are capable of storing so many more disconnected facts than we can in our knowledgeable brains. We have been freed to use our brains in ways we truly enjoy. Information, which yesterday was the

defining property of our age, can now be purchased for a few hundred dollars. We are freed to use our minds to build story engrams with the disconnected facts that are stored in the machines, and to create fabulous edifices of the human mind. That is what it means to have entered the knowledge age.

Given our research findings that showed how easy it is to teach thinking with story engrams, our knowledge age could become the sharing age. It is in the nature of stories to be shared. For when we create stories it is not just to help us think, but to tell them to others. Stories bind us together as a species. Other possessions — land, money,

or information — can be hoarded and used primarily to their owner's advantage. But the *raison d'être* of stories is communication. They belong to all of us.

We have the chance to enter a great age of intellectual bonding, an epoch of greater human equality. It could be an age where those ungenerous feelings we had toward our successful students would be woes from a bygone time. Instead of perceiving knowledge as property to be hoarded in order to achieve status, importance, and identity, this new era would see knowledge as the shared story of mankind. ☺

## Animal Talk

*People are good at finding "communication" everywhere — it's what we're specialized for, if anything. But the noises animals make may go way back to our common reptilian ancestors. Morton and Page here proceed to test that hypothesis; in the process they give a good education in scientific method and in the way an evolutionary approach can explain animal behavior. —Hank Roberts*

■ Birds apparently sing in a manner to achieve not necessarily maximum loudness but, instead, maximum delivery of sound over distance with a minimum of degradation from the acoustical obstacles of the immediate environment.

■ Is a singing bird out just for itself, providing accurate distance information only when it provides the singer with a net gain of some kind over its competitors? In the latter case, singers should typically use songs designed acoustically to degrade as little as possible, and therefore not as predictably, making the perceiver's ranging judgments more difficult. The logic of natural selection would suggest this, and there is a way to check it out in the field.

If singers use songs that degrade as little as possible, we should find songs degrading

less in their original, native habitats than in some marginal or foreign habitat. Conversely, if the songs are "designed" to degrade predictably, degradation should occur predictably in any habitat either foreign or native to the song's evolutionary origin.

● What quickly emerged from looking at the shapes of a variety of animal sounds was startling. The wren's *chirt* occurs quite high, in the range of two to six kHz, while the bark of a dog occurs in the range of 0.1 to 0.8 kHz. But once that vertical difference between the two on the scale has been adjusted for, looked at side by side, so to speak, they appear very much alike: a chevron. In effect, wrens bark and dogs *chirt*: It's the same thing. Both go up and down to varying degrees.

There is an old saying that barking dogs don't bite, and in fact this tends to be true. The reason lies in the chevron shape of a bark on a spectrogram. It goes both up and down, fear and aggression mixed, a sound that in effect says, "I'm alert to something here and I'm not sure how I'm going to act." When the bark descends down the scale, finally becoming a low roaring growl, it is time to get out of the way, or pick up a rock.

● To turn yet again to the Carolina wren, in



### Animal Talk

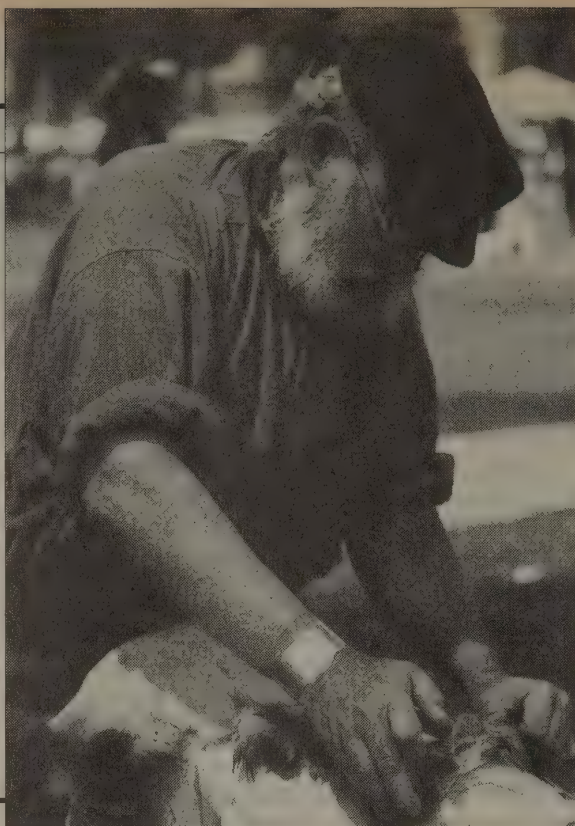
Eugene S. Morton and Jake Page, 1992; 275 pp.

**\$22** (\$24 postpaid) from Random House/Order Dept., 400 Hahn Road, Westminster, MD 21157; 800/733-3000 (or Whole Earth Access).

the deciduous forests of Maryland, winter is a truly terrible time for these birds, in particular when it snows. The snow blankets food sources and a wren must seek out such food as can be found in sheltered areas, beneath a fallen log, for instance. The birds are all literally on the brink of death for as long as the snow cover lasts, and the sad fact is that mortality among these birds in that area is often close to 90 percent. So the Carolina wren that can most successfully disrupt its neighbors, causing them to cease foraging at the most desperate time in their lives, is likely to inherit their territories . . . and any fallen logs there may be.

## The Buckskinner's Craft

Tony Willoughby is a classic old pro, the grand uncle who shows you how to do things that used to be common knowledge — things that are hard to explain well in books. Mr. Willoughby knows about using deer hide. (Animal-rights folk may howl, but the fact is that thousands of deer are killed every year, on purpose or by accident, and most of their hides are thrown away.) The first video in this series shows the skinning of a deer in closeup, sometimes oogy detail. In the second, you watch him turn the hide into buckskin. The accompanying chat is full of tips, warnings, wry humor, and encouragement. Video quality is crude but entirely useful. Later tapes will show how to use the buckskin in various traditional ways. —J. Baldwin



## The Buckskinner's Craft

(7-volume video series)

**\$24.95 - \$29.95**

each from

Hands On Video

Productions,

71 E. Williams Ave.

Fallon, NV 89406;

702/423-2769

## Sell Yourself to Science

*Psst! You wanna sell an eye (\$4,000)? Kidney (\$10,000)? Sperm? Breast milk? Blood? Hair? Selling body parts and secretions from humans, live and dead, is done every day. The lucky recipient also receives a large parts bill along with the usual labor tab, but the donor most often gets nothing unless they or their survivors insist. You can also sell your services as a live human guinea pig. Sounds sort of not quite right, like something not mentionable in the media or polite conversation.*

*This occasionally outrageous book not only mentions the subject in all its gory details and possibilities, it gives the names, addresses, prices, and protocols necessary to play the game. Sooner or later, society is going to have to deal with all this. Might as well bone up now, so to speak. —J. (Why are you looking at me that way, dear?) Baldwin*

- Everybody but the donor is allowed to profit from organ transplants. When an organ donor dies, he or she sets into motion more than \$1 million worth of medical procedures. The organ banks get paid, the hospitals get paid, the doctors and their assistants all collect their fees. The organ recipient benefits more than anyone, perhaps with a new lease on life. But it is against the law to give money to the donor, so most potential donors keep their organs to themselves.

- A recent CNN/Time Magazine poll showed that while only 6% of respondents favored

forcing a person to donate an organ, 56% would be prepared to buy one if necessary. Nearly one fourth would be willing to conceive a child merely for the purpose of providing life-saving tissue.

- The latest information I have is that the price of a cornea in India is somewhere around \$4,000 dollars. Don't start ruining things by lowering the price. If an impoverished Indian peasant can get four grand, price your eye accordingly. And, yes, you will be disfigured by the operation and probably have to wear an eye patch or get a glass eye and you will lose your depth perception as well as disqualify yourself for certain types of jobs and licenses, etc.

- Having a loved one die suddenly (as is often the case) is traumatic in the extreme. The thought of trying to make money off it should be sickening. On the other hand, people do buy cemetery plots before death and try to get a good deal. They just do it while they're still healthy. Once again, the time to think about organ vending is prior to death, not when you're grief-stricken. If you don't make plans for this kind of hard-nosed wheeling and dealing now, I urge you to forget it. Do not try to hammer out business deals over dead relatives in such an extreme situation. In this case, please donate or don't donate and be done with it. You've got far more important things to occupy your thoughts and emotions than money.

That having been said, let's look at a strategy for dealing.

The first thing you should try for is forgiveness of any outstanding hospital bills. The procurer may be in a good position to arrange this. Not only is this the easiest way to "buy" organs, since no money changes hands and any "losses" incurred by the hospital are smaller than whatever you owe them, this is highly possible. Besides, it may only be that you owe the hospital a few thousand or even a few hundred dollars.

This method has the added benefit of letting you avoid the pain later on when the bill comes. It's amazing, but for all their sappy death metaphors and "we understand what you're going through's" the hospital will be very stubborn about letting you off the hook for any amount of money. You've got to be just as stubborn.

I would suggest that you make it clear that they can have all the organs they want, if they will let you go home and not bother you anymore.

## Sell Yourself to Science

Jim Hogshire, 1992; 160 pp.

**\$16.95** (\$20.95 postpaid) from

Loompanics Unlimited, P. O. Box 1197,  
Port Townsend, WA 98368



## Mütter Museum 1993 Calendar

Say, folks: do you long for the loamy silence of the grave? Me too. This unspeakably lovely collection of mementos mori speaks of sunstruck motes dancing in crepuscular halls; distempered masonry and clean tile; must and fustian, austere formaldehyde, sweet ether, and cold meat. The months are illustrated by duotone photographs of, ah, tastefully contrived tableaux involving remnants and facsimiles of medical curiosities from The Mütter Museum of The College of Physicians of Philadelphia.

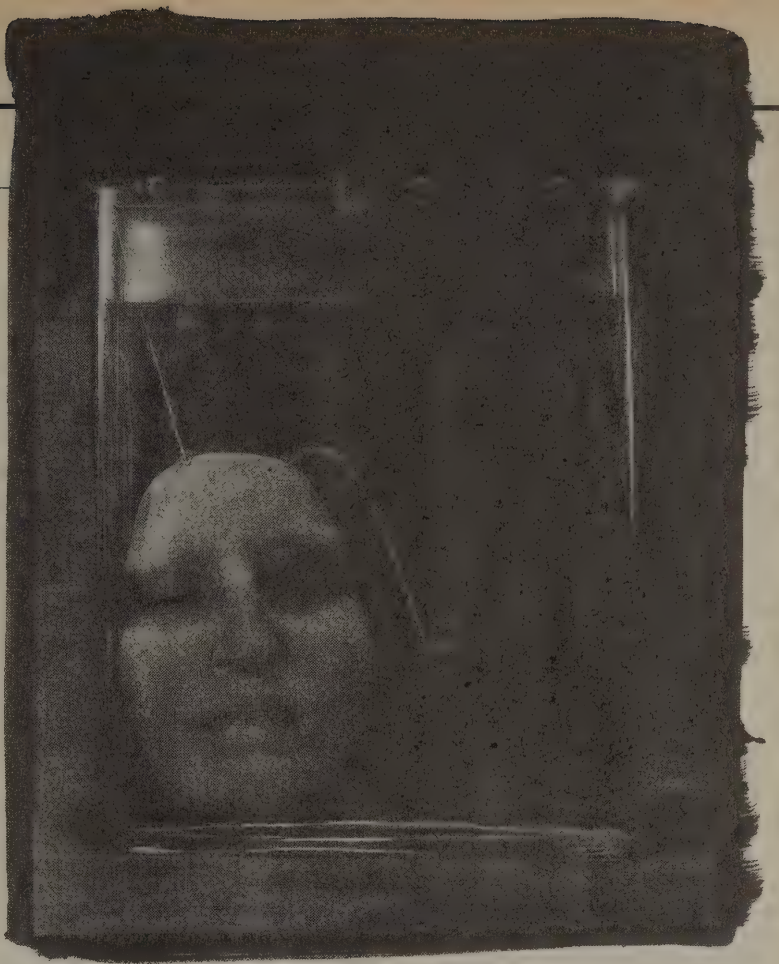
Open to the public since 1863, the Mütter Museum must be a fascinating place; it's at the top of my list of diversions for that keenly anticipated pleasure jaunt to Philadelphia. —James Donnelly

### Mütter Museum 1993 Calendar

Laura Lindgren, Art Director

**\$14.95** (\$16.45 postpaid) from

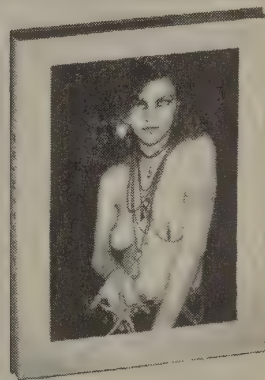
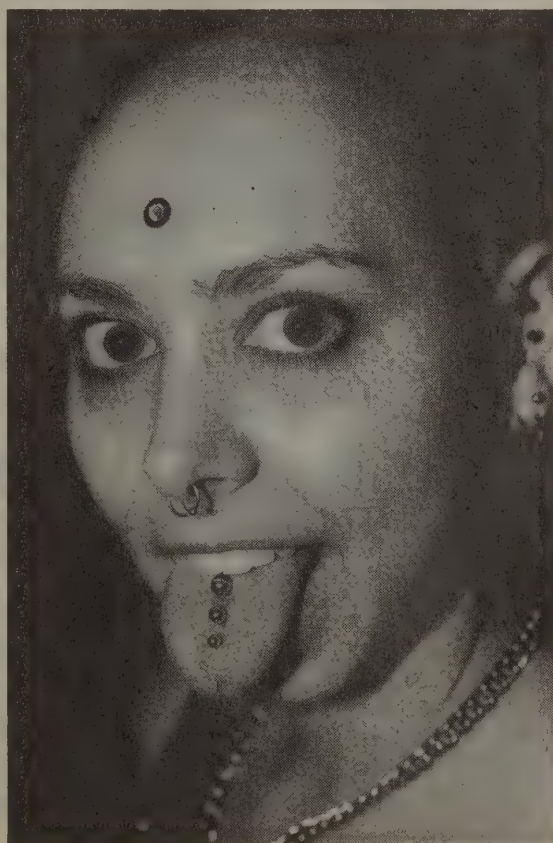
The College of Physicians of Philadelphia/  
Mütter Museum, 19 S. 22nd Street,  
Philadelphia, PA 19103



## Primitives

Body modification and adornment have become surprisingly popular in the last few years. In most large cities, it's no longer unusual to see a waiter sporting a nose ring or a cabbie with a tattoo creeping out of his or her shirt collar. Septum, labrette (chin), and tongue piercings are the newest of the show-and-tell variety. The truly "undercover" manipulations, which you don't see on the streets — the very extreme — can be found in a handful of magazines and books documenting this movement toward primal expressions of sexuality and self. In Gatewood's beautiful, black-and-white **Primitives** (a signed and numbered collector's edition of 2,000) we find not only lush photos to ogle and ponder, but a kind of stream-of-consciousness commentary on the linking of body art with "magic, freedom and the development of untapped human potential." I'm not sure if a labia piercing would really enable me to reach my own highest level of human potential, but this oversized, hardbound, bedside (as opposed to coffee-table) book possesses a certain allure some will find difficult to resist.

—Lory Fleming



### Primitives

(Tribal Body Art  
and the Left Hand Path)

Charles Gatewood,  
1992; 63 pp.

**\$52** postpaid from  
Flash Publications,  
Box 410052, San Francisco,  
CA 94141

## Diet for a New America • May All Be Fed

The first of these books changed my life. John Robbins shows the deleterious effects of our meat-centered diet — on ourselves, on the planet, and of course on the well-being of the creatures we consume. It was the kind of book I couldn't put down — the author's approach increased my awareness so dramatically that I found it impossible not to make radical changes in my diet.

*Diet for a New America* is also available as a 60-minute video, produced by KCET/Los Angeles — it's been running on PBS for the past year.

A sequel to *Diet*, *May All Be Fed* goes the next step, giving concrete suggestions and resources for making change in the politics of how food ends up on our plates. Approximately 200 pages of delicious, healthful recipes (free of meat and dairy products) are included. —Christine Goodson

• We need our forests. They are vital sources of oxygen. They moderate our climates, prevent floods, and are our best defense against soil erosion. Forests recycle and purify our water. They are homes for millions of plants and animals. They are a source of beauty, inspiration, and solace to millions of people.

The Bureau of Land Management and the Forest Service say there is nothing we can do to stem the tragic destruction of our forests.

"People have to eat," said one agency official, shaking his head. And he's right — assuming the present meat habit, there is nothing we can do to save our forests. But diet-style changes could not only halt the process of deforestation, they could actually reverse it. Of the 260 million acres of American forest that have been converted into land now used to produce the standard American high-fat low-fiber diet-style, well over 200 million acres could be returned to forest if Americans were to stop raising food to feed livestock, and instead raise food directly for people. Indeed, so direct is the relationship between meat production and deforestation that Cornell economist David Fields and his associate Robin Hur estimate that for every person who switches to a pure vegetarian diet, an acre of trees is spared every year.

—*Diet for a New America*

• Perhaps the most blatant example of the Department of Agriculture's subservience to the meat and dairy industries at the expense of public health is the school lunch program. Each year, the USDA buys three to four billion dollars' worth of surplus

foods, which it donates to the nation's schools. These donated items make up 20 to 30 percent of the food served in school lunches. This may sound as if the USDA were helping our children to eat well, but look again. The school lunch programs are being used by the Department of Agriculture to guarantee a market for the meat and dairy industries. By 1991, the evidence implicating high-fat, high-cholesterol animal products in the creation of heart disease, cancer, adult-onset diabetes, and obesity had become as massive and incontrovertible as the evidence linking smoking to lung cancer. Yet in 1991, 90 percent of the USDA surplus foods consisted of eggs, high-fat cheeses, butter, ground pork, ground beef, and whole milk. If the USDA had intentionally gone out to obtain foods that would destroy the health of our children, they could hardly have done better. Furthermore, while the USDA donates hundreds of millions of dollars worth of high-fat cheeses, schools must pay for low-fat cheese.

The results are catastrophic for the health of our children. A 1990 study in the *Journal of School Health* found that the average school lunch gets 39 percent of its calories from fat. This, while the Surgeon General was saying that anything over 30 percent is dangerous, and health experts who were

## Relief From Back Pain • Nada-Chair

Taking care of your back is one of those things you learn how to do from experience. Bad experience. Unless you've been through your own adventures with a bag of frozen peas (they make the best ice packs) it is hard to conceive how fragile and vulnerable backs and necks can be.

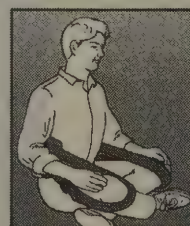
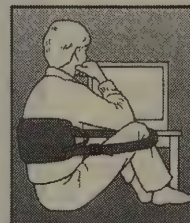
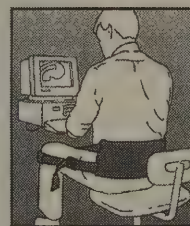
Learning what not to do is crucial. *Relief From Back Pain* is a video that's good at demonstrating things as simple as the right and wrong way to load a dishwasher. It also has exercises to maintain the spinal column, and guided visualizations. And the models in this tape look like real people instead of yogic pretzels.

Good back or bad back; for anyone who sits at a desk, or around a campfire, or does sitting meditation, the Nada-Chair is one nifty tool. It's a piece of foam for the small of your back that's attached to nylon webbing that straps over each kneecap. Sounds like a contraption, but it is infinitely adjustable and quite comfortable (just don't try it while driving). Helps you sit up straight for hours on end. —Richard Nilsen



**Relief From Back Pain**  
**\$29.95** (\$33.95 postpaid) from Spectrum Sports Research Institute, 21 Tamal Vista Blvd./Suite 155, Corte Madera, CA 94925; 800/488-BACK

**Nada-Chair**  
**\$39.95** (\$44.95 postpaid).  
 783 NE Harding Street, Minneapolis, MN 55413; 800/722-2587



### NADA-CHAIR®

On the outside, it's a simple blue building on a quiet Minneapolis street. On the inside, it's a bustling office — no brass nameplates, no mahogany desks, no suits and ties. Just nine people dedicated to bringing you the comfort you need and the high quality product you deserve. **Nada-Chair.**

Many people ask us, "What does **Nada-Chair** mean?" It's quite simple. "Nada" (pronounced nah-da) means "nothing" in Spanish. So you are holding the "Nothing" Chair. It weighs practically nothing. It looks like nothing you've ever seen before. There's nothing you can buy that will give you more comfort. So strap on the **Nada-Chair**. There's nothing to it!

**Your satisfaction is guaranteed**, so give it a go! You have nothing to lose but your backache.



not as bound by political considerations were urgently calling for a reduction to 20 percent or less.

—*May All Be Fed*

■ Hot Tamale Pie

(Makes one 8-inch square pie)

- 1 tablespoon olive oil
- 1 medium onion, finely chopped
- 1 medium yellow, red, or green bell pepper, seeded and finely chopped
- 2 garlic cloves, minced
- 1 16-ounce can unsweetened tomato sauce
- 1 16-ounce can pinto beans, rinsed and drained
- 1 ear corn, kernels cut off the cob, or 3/4 cup (thawed) frozen corn
- 1 teaspoon chili powder
- 1 teaspoon ground cumin
- 1/2 teaspoon fine sea salt
- Pinch of cayenne pepper
- 3 cups water
- 1 cup yellow stone-ground cornmeal
- 1 tablespoon freshly squeezed lemon juice
- 1 teaspoon Dijon mustard
- 1/2 teaspoon fine sea salt

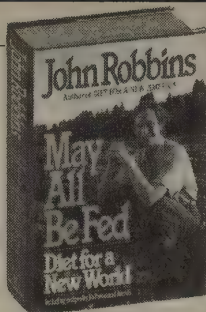
Heat the olive oil in a large frying pan over medium-high heat. Add the onion, bell pepper, and garlic and cook until softened, 6 to 8 minutes. Remove from the heat and stir in the tomato sauce, pinto beans, corn, chili

powder, cumin, salt, and cayenne. Pour into an 8- by 8-inch glass baking dish.

Preheat the oven to 350°F.

Boil the water, add the cornmeal, lemon juice, mustard, and salt in a large saucepan, and stir until mixed. Bring to a boil over medium-high heat, then immediately reduce the heat to low and simmer, stirring often, until thickened, 3 to 5 minutes.

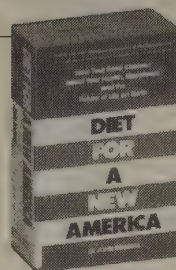
Spread the cooked cornmeal over the bean mixture. Bake for 30 minutes. Cool for 10 minutes before serving. —*May All Be Fed*



**May All Be Fed**

John Robbins, 1992; 415 pp.

**\$23** (\$24.50 postpaid) from William Morrow and Co./Wilmore Warehouse, 39 Plymouth Street, Fairfield, NJ 07004; 800/843-9389 (or Whole Earth Access)



**Diet for a New America**

John Robbins, 1987; 431 pp.

**\$13.95** (\$17.45 postpaid) from Stillpoint Publishing, P. O. Box 640, Walpole, NH 03608; 800/847-4014 (or Whole Earth Access)

**Diet for a New America** (video)

**\$19.95** (\$23.95 postpaid) from EarthSave Foundation, 706 Frederick Street, Santa Cruz, CA 95060; 800/362-3648 (orders), 408/423-4069 (information)

**EarthSave Foundation**

*Would you like to see less junk and more real food in your kid's school lunch? Have you wondered what you could do about food irradiation? Would you like to get involved with healthful cooking classes? EarthSave Foundation may be able to help. Founded in response to the overwhelming amount of concerned feedback from **Diet for a New America**, EarthSave educates people about the economic and health costs of their dietary choices and provides resources for positive alternatives. EarthSave accomplishes this through workshops, books and videos, quarterly newsletters, local support and action groups, school nutrition and environmental programs, and more.*

—Christine Goodson

● **Making the Cow Obsolete**

[Henry] Ford was a contradictory personality. Although he was not a vegetarian, he maintained that meat and milk were unnecessary. He owned a choice herd of dairy cattle, but considered dairy farming inefficient. "It takes 20 days of actual work to grow and harvest the grain crops on a dairy farm," he said in 1925. "The rest of the time is spent taking care of animals. It is all wrong."

**EarthSave Foundation**

Membership **\$35/year** (includes 4 issues of *EarthSave* newsletter). 706 Frederick Street, Santa Cruz, CA 95060; 800/362-3648 (orders); 408/423-4069 (information)

**Dyna-Bee • Gyrobic-1**

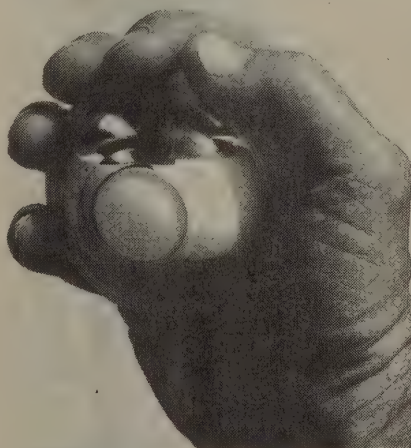
These are hand-held gyroscope wheels, with the ends of the axle free to move in a groove inside a plastic shell. Once they're started (by hand), they speed up as you wrestle with them — a lot of fun, a good workout for the arm and hand muscles, and a lesson in precession.

The Dyna-Bee is a lightweight 2 1/2" sphere that hums loudly when it's up to speed. It takes work (you have to keep the RPMs up or it stops). It's glued together and not repairable once it gets dirty or worn enough to wobble inside. Most people need a pull-string, recently added to the package, to start them up. Recommended for people with smaller hands.

Fritz Mishler has improved on his uncle's original Dyna-Bee design. The Gyrobic-1 is 3" across, wide around the middle, and can be opened to clean the innards when it inhales enough lint to slow it down. It's a bit heftier, smoother-working (no loud buzzing sound), and will spin slowly and quietly as well as fast. It's easier to keep it going. "It feels like it's putting out more energy than I put into

it," said Cliff Figallo, when I handed one to him. Rare enough, these days.

—Hank Roberts



**Dyna-Bee**

**\$24.95** (\$28.45 postpaid) from NordicTrack, 141 Johnathan Boulevard N., Chaska, MN 55318; 800/765-9472

**Gyrobic-1**

**\$29.95** postpaid from Gyro Dynamics International, Inc., 18700 Indian Creek Road, Willamina, OR 97396-9516; 503/876-2001

## Feminine Ingenuity

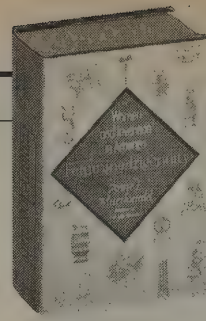
Only about 6 percent of patents are issued to women. Popular feminist literature rarely mentions the subject. Historian (and patent holder) Anne Macdonald has found that women have been very inventive indeed, though their patents are often in the name of a husband or employer. Her many examples are accompanied by a look at the often-discouraging social conditions that prevailed at the time, whenever that was. The lively discussion offers an unfamiliar perspective on the fight for women's rights. There is much cause for outrage. Authoritative, enlightening and inspiring. —J. Baldwin

With the Depression of the 1930s bringing mass unemployment, slogans such as "Don't steal a job from a man" and "Get the Men Back to Work" so discriminated against women in the work place that even single women who traditionally worked in offices, factories, stores, schools, and the government had a hard time hanging on to their jobs. It was even worse for married women. Twenty-six states actually prohibited employing them.

[Lillian Greneker] suspended the rope from a ceiling fixture above and watched it fall naturally into coils as it embedded itself in the wet plaster below. She left one end sticking out. She and the artisan leveled and smoothed the plaster (now webbed with rope) to a uniform half-inch thickness and let it set. It was now possible, she surmised, to seam two identical forms to make a cylindrical mold over which workers could stretch and vulcanize the rubber sheeting. When that was done, one had only to yank the rope, shatter the plaster, and tug the pieces through the hole at the top — leaving the outer rubber fuel tank intact. She called in the engineers.

Having them witness that "rope trick" was a moment she savored, so much so that four decades later, when she was almost ninety, she wrote (in what was probably planned as an autobiography but never finished): "It was too easy! . . . [T]he men hated the rope; [they said] only a woman would think of that. They seemed even to be embarrassed, having to handle it so delicately. '[It's] like sewing,' they said." Engineer Herbert Polleys, however, was not among the scoffers and quickly dispatched to Pleasantville the company's precious wooden form for a mold for the fuel cell needed for the Grumman Hellcat fighter plane so that Greneker and her assistants could take its measurements and make the first production model.

By the end of 1946, two million women had been fired from heavy industry — over



### Feminine Ingenuity

(Women and Invention in America)

Anne Macdonald, 1992 (Ballantine); 528 pp.

**\$22.50** (\$24.50 postpaid) from Random House/Order Dept., 400 Hahn Road, Westminster, MD 21157; 800/733-3000 (or Whole Earth Access)

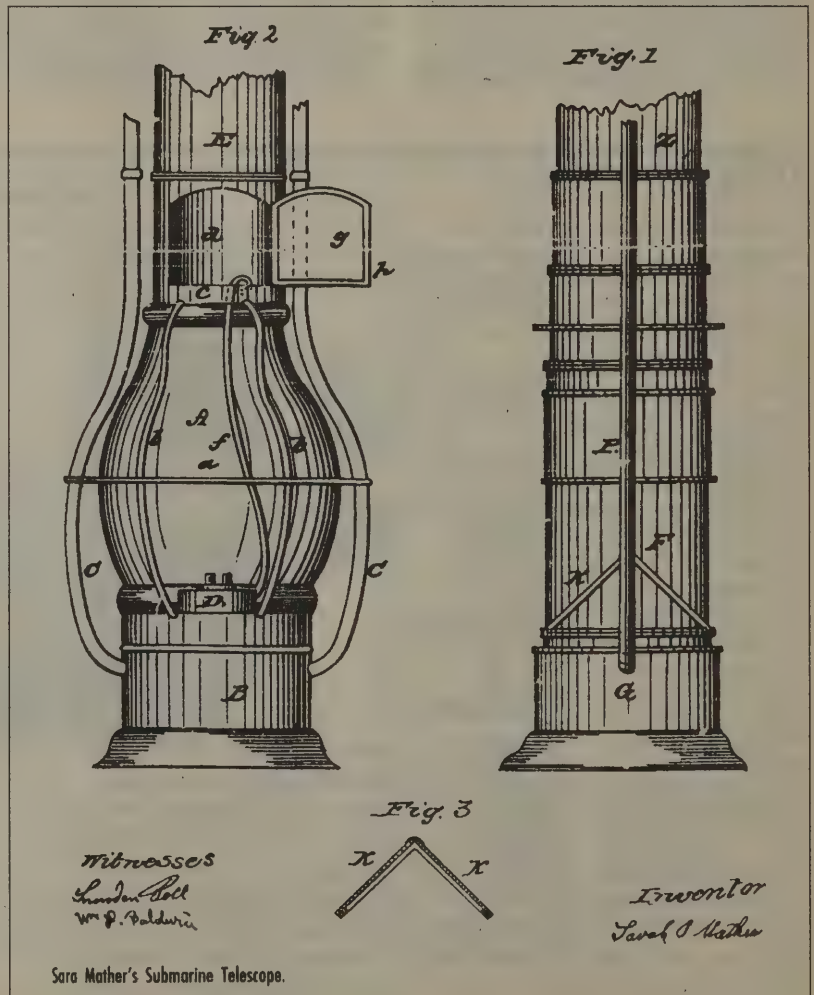
eight hundred thousand from the aircraft industry alone — and the few who managed to survive the cuts received only a small percentage of the pay men would receive for the same work. Those exiled from the labor force were so indelibly marked by the wartime experience of tasting freedom and independence and discovering their own capabilities that they were often listless in the numbing confines of the suburbs.

## The Mismeasure of Woman

Women — different, special, more in touch . . . It's easy to fall into the two-worlds notions — as easy to exalt as to denigrate, based on presumed, "obvious" differences. Are we so different? Carol Tavris looks at the published research and concludes that politics, not nature, sets the sexes apart falsely, and points out pervasive, hidden assumptions that have led us for a long time in interpreting our apparent differences.

—Hank Roberts

My concern is with a growing tendency to turn the tables from us-them thinking (with women as the problem) to them-us thinking (with men as the problem). Framing the question in terms of polarities, regardless of which pole is the valued one, immediately sets up false choices for women and men. It continues to divide the world into men and women as if these categories were unified opposites. It obscures the fact that the opposing qualities associated with masculinity and femininity are caricatures to begin with. It perpetuates what I will argue is a mis-



guided belief that there is something special and different about woman's nature, an attitude that historically has served to keep women in their place. It continues to use the male norm, although this time to define what is supposedly right with women instead of what is wrong with them.

Moreover, celebrations of "women's natural ways of being" have, I believe, the potential to be as oppressive to women as the denigrating attitudes they replace.

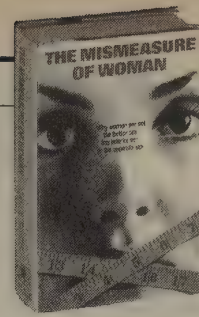
■ No one knows what rôle, if any, the callosum plays in determining a person's mental abilities. Most damaging of all, the sex differences that the researchers claimed to have found in the size of the corpus callosum were not statistically significant, according to the scientific conventions for accepting an article for publication.

Bleier again wrote to *Science*, delineating these criticisms and also citing four subsequent studies, by her and by others, that independently failed to find gender differences of any kind in the corpus callosum. *Science* failed to publish this criticism, as it

has failed to publish all studies that find no gender differences in the brain.

■ Many men fail to be recognized or diagnosed as depressed because, as with love, *what women do when they are depressed constitutes the norm on which the criteria for depression are based.* In clinical research and psychotherapy, most of the measurements of depression and distress are measured on typically female reactions such as crying, staying in bed, talking about one's unhappiness and misery, and developing eating disorders. Because many men do not express grief this way, it is easy to infer that men suffer less than women when relationships are in trouble, or even that men are incapable of love.

■ We can become aware of the hidden agendas not only in old-fashioned stories but also in modern ones. It is easy to discern the political purpose of the diagnosis of drapetomania, that nineteenth-century "disease" that afflicted slaves with an uncontrollable urge to escape from slavery. Yet



### The Mismeasure of Woman

Carol Tavris, 1992 (Summit Books); 399 pp.  
**\$23** (\$26 postpaid) from Simon & Schuster, 200 Old Tappan Road, Old Tappan, NJ 07675; 800/223-2336 (or Whole Earth Access)

it is equally important to identify the uses of diagnoses such as PMS and Self-defeating Personality Disorder today. It is easy to see the bias in labeling as "sick" those women, years ago, who refused to play their traditional roles and wanted instead to be lawyers, scientists, and artists. It is equally important to recognize the bias in labeling as "sick" (e.g., "addicted") those women today who play the traditional role of caretaker too well.

## Falling Apart

*Stress is here among us and breakdowns are happening more and more. Worker's Comp claims for stress-related illness have gone up 700 percent in the last decade.*

*Falling Apart* gives you the stress and breakdown facts, in a readable fashion, using case studies to make points and describe processes and solutions. The book tells what signs to look for, how to change behavior patterns, and what to do if a breakdown occurs.

*Perhaps the most important point the book makes is to learn what your own warning signs are and to do something about them, now. Even if you are not headed for a breakdown, this book can help improve your quality of life as you learn to eliminate or deal with many of its stresses.* —Susan Erkel Ryan

### Ten Signs of Stress

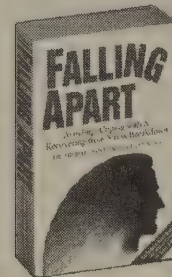
1. Crying easily.
2. Depression.
3. Low confidence.
4. Irritability.
5. Poor memory.
6. Muddled thoughts.
7. Exhaustion.
8. Loss of interest in sex.
9. Sleeping problems.
10. Fear of social situations.

### Ten Ways to Cope

1. Rest.
2. Time off work.
3. Counselling; medication can sometimes be useful for sleep problems, anxiety and depression.
4. Make your diet more nutritious, with an emphasis on vegetables.
5. Cut out alcohol and cigarettes.
6. Keep a diary of how you're feeling.
7. Avoid anything upsetting, which may include television and newspapers.
8. Only spend time with people who accept you.
9. Pace yourself; use your body's symptoms as a guide. For example, if gardening makes you tired, stop.
10. Think positively — people get better.

■ During your recuperation you will be surprised at how many people you will have to tell the story to. It will start to sound like a broken record as it is told to yet another doctor, counsellor or lawyer. As time passes, you might worry about forgetting important details and be bothered about these omissions later.

Invariably, someone who has had a breakdown is shocked by how intense their feelings are when they are asked to recall what happened. Even more disturbing is the realisation that the memory has not been very well buried. Any small reminders of the



### Falling Apart

(Avoiding, Coping with, & Recovering from Stress Breakdown)  
 Michael Epstein and Sue Hosking,  
 1992; 312 pp.

**\$12.95** (\$15.20 postpaid) from  
 CRCS Publications, P. O. Box 1460,  
 Sebastopol, CA 95473; 707/829-0735

trauma are bad enough but having to explain it to someone new is like being right back there, re-experiencing it. The more successful you think you have been in forgetting it, the more distressing it is to find it all emerging again. It can feel as though all this time has passed and yet you are no better, although actually you have recovered much more than you imagine.

## Gossip

There's no peace for the living, but some semblance of calm has returned to 27 Gate Five Road, just in time to ensure that my guest editorship is extraordinarily pleasant. Next door, the WELL seems to be humming right along, too. There is yet another new face here: Marly Norris, imported from Metropolitan Entertainment Inc., the premier East Coast concert promoter, and transplanted to the Bay Area to be Jon McIntire's new assistant (Jon thanks his lucky stars). They have common roots, having worked together on multitudinous Grateful Dead engagements and other projects.

Never miss a meeting — you never know what'll happen. I got voted in as Guest Ed. while away in Wichita, directing the disassembly of Buckminster Fuller's only Dymaxion House. It'll be displayed at the Henry Ford Museum/Greenfield Village in Dearborn, Michigan in time for Bucky's hundredth birthday in 1995 — story in a future issue.

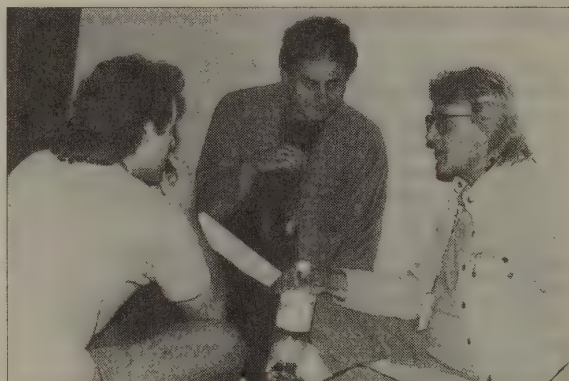
I hereby relinquish the editor's green eyeshade and Howard Rheingold's despicably cluttered office to our spring issue's guest editor, Jon Carroll, *San Francisco Chronicle* columnist of high repute. He's already hard at work on it. I'm going home to write a book.

May your coats  
be long & glossy,  
J. Baldwin

Kathleen O'Neill

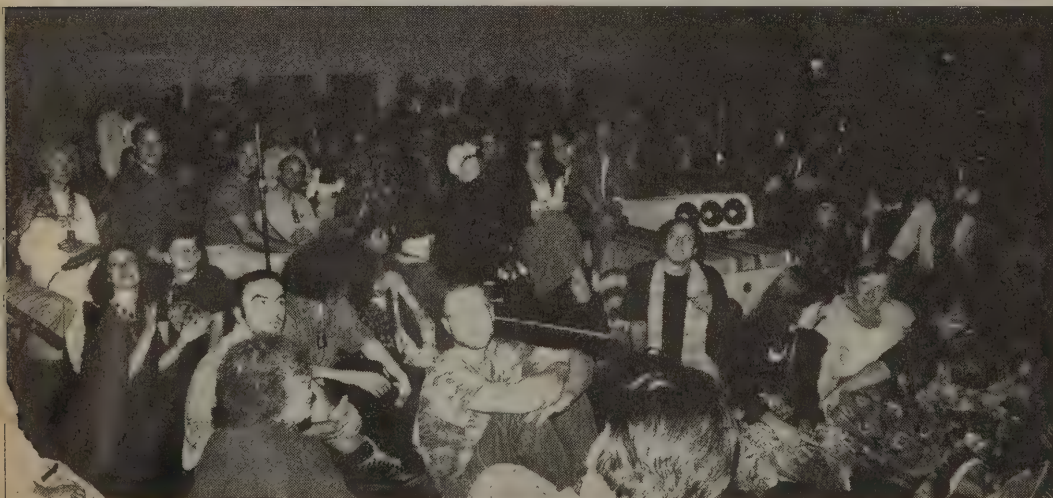
About 400 WER and WELL subscribers, contributors, friends, and crew showed up for our first **Think Globally, Dance Locally** benefit party, held September 19. We filled an exhibition hall and two smaller rooms at San Francisco's commendable Fort Mason Center. Jon McIntire's idea was to put us WER-producers into a bottle along with some contributors and a bunch of our subscribers and give it shake to see what would happen. I arrived late but had no trouble finding the right building — it was the one with the roar of 200 simultaneous (and necessarily loud) conversations pouring from the door into the foggy night (if there had been the sound of breaking glass too, I would have guessed a barroom brawl). Inside was a tumult of introductions, food & drink, dancing to Crazy Fingers (who were joined by Tom Constanten tantalizing the keyboards), exhibits, extraordinary body painting, some giant buzzing/strobing bees, and a man wearing MIDI sound

controllers, making his own music as he moved. A computer-engendered light show illuminated one wall. Ceiling-high king and queen sculptures — ex-Grateful Dead concert decor — ruled the room. Set up by the Mighty Spoonman, Wavy Gravy, and Phil Catalfo, some of us showed off on stage, briefly pushed a few favorite concepts and generally preached to the choir. Great Idea bullets whizzed around the room. Cross-pollination occurred. There was a great didgeridoo solo. I don't know if anyone thought globally, but we sure as hell danced locally. There'll be another on January 16 (call for info) at Opts Art Gallery (250 Fourth Street in San Francisco), a beautiful open space which should prove something of a catalyst in and of itself. Y'all come now, hear? —J. Baldwin



Gail Williams

Conspirators Squatting in a Doorway:  
Chris Lofaro, Mark Petrakis (Spoonman), Jon McIntire.



A lively outbreak of Haunch Dancing marked the transition from Global to Local activities.

## Thank Gratefully,

Speakers: Kevin Kelly, J. Baldwin, Evelyn Pine, Stewart Brand, Howard Rheingold, George Gleason, Will Baker, Suzanne Gilbert.

MCs: Wavy Gravy, Phil Catalfo, Spoonman.

The Art Police:

Freddy Hahne — Police Chief and source of all silly wisdom.

Marty Lefkowitz — crew/queen and king technician.

Matisse Enzer — carpenter and jack of all trades.

Jennifer Roberts — artiste extraordinaire.

Phyllis Laurie — lighting ambience.

Helvetica Hahne — crew/room C.

Curtis Scheirer — water fountain technician.

Further Thanks To:

Candace (the magic of mylar) Brightman and Dennis Hawley for lights.

Howard Danchik, Glenn "Chub" Carrier and Ultrasound for sound that was *ultra* . . .

Crazy Fingers (David Gans, Bob Nakamine, Axon a.k.a. Alan Chamberlain, Cyrus Azar, Rik Elswit) and special guest Tom Constanten for MUSIC!

pARTY/SCIENCE (Joegh Bullock & Mark Petrakis).

Larry & Barry Brilliant for gorgeous laminate production, and David Biedny for laminate design.

## The Fluctuating Price of Tea in China

Does this ever happen to you?

Your mind starts putting ideas and experiences together and the growing realization seems very important. Then you start seeing most everything through the filter of those concerns. Well, that's happening to me. And my obsessive realizations cluster around issues of abuse and denial.

We get many letters reflecting what readers think of us: what they think we do well or badly, or neglect. They don't all get printed, they don't all get personal replies, but we pay attention to them. Lately several readers have asked for more information about staff changes at WER and the WELL (notably the departure of Cliff Figallo, Kelly Teevan, and Jonathan Eveleigh). And, of course, I bring past concerns to how I look at this.

To paraphrase Paul Valéry, events are but the foam atop the waves. You don't see even the waves, much less the powerful currents of the ocean beneath. An attempt on my part to explain these events wouldn't show anything clearly; they are viewed too differently by each observer and participant. Little that is true or illuminating would be conveyed from an individual perspective, or at this distance in time from the events. Perhaps something could be learned from scrutinizing intimate specific events — things that seem unimportant at the time. The small stuff is easier to gloss over than the Big Stuff, but may prove to show more of who and how we are.

Perhaps it's good to make the vulnerable choice and try to be honest, display those events, don't dissemble — even if it's a choice that doesn't make for clarity. I see this choice as a sign of strength, an attempt at responsibility. But this sort of effort at honesty is usually confusing. The effect probably won't be what was expected or desired.

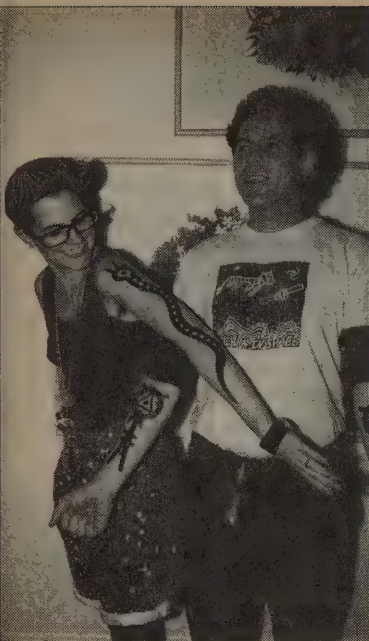
I don't think we humans know ourselves very well as individuals, as organizations, or as a species. I think it imperative that we realize that and feel threatened by this schism. Since we don't know who we are, our attempts to decide where we can go and how to get there are made almost blindly. We hide from ourselves and from each

other in conscious and unconscious ways, too often to our individual and collective detriment.

My belief in the importance of acknowledging this condition comes from my background of working with others to diminish abuse. This work led me to believe that denial is universal. To be abused physically or sexually as a child is "normal"; to be abused psychologically is probably universal. I'm not saying it should therefore be accepted; I am observing that, as individuals and as a society, we cover over the specifics of this reality in an attempt to "get on with our lives." So accept it (why) or change it (how): we all abuse in one way or another. We don't realize the extent of our abuse. Some abusive behavior is viewed as reality, "the human condition" — and *some of it may be* — but much of that abuse can be avoided if our behavior is made more conscious, if we drag ourselves into a more brutal honesty, a more intimate scrutiny of our motives and behavior. Somehow judgments (which lead to expectations) will have to play a smaller part in the way we conduct our lives.

Big stuff, I admit. And like most big stuff, it can best be approached and effected in small ways. I don't really find much of use that's not intimate. I'm told that in this magazine we don't want to whine or complain; we want to display ideas and tools that can lead the individual to make choices and take action in the world and live a more satisfying life. So what can we do here at WER, in our corner of the whole Earth? Look for signs of dysfunction: what are we denying? In what ways are we more limited than we perceive? How can we bring in more perspectives, more real information? How can we get more material from outside our experience to broaden our perspectives ("African Wedding" and "Egg Sex" are two recent articles that did this for me)?

I don't think WER is more dysfunctional than most organizations: my reading is that it may be less. Folks here are open to looking into how to do things better; we need to turn that scrutiny to how this organization deals with its problems, its shadow stuff, its self-neglect. (As in: "So-and-so just did something that hurt me but I'm not even going to look at it because I'm [writing an article] and I don't have the time right now." But is that the most driving reason for that decision?) Yes, there are times when avoidance is necessary. You can't deal with everything all the time. But time must be spent, noses held and dirty laundry brought to light, or you fall farther and farther into delusion. You become too removed from who you really are, what's really driving you. Your blind spots grow and flourish. And this neglect will show in your work. —Jon McIntire



The Young and the Smirched: Freshly painted M Normal™ writhes her inky axolotl at Gil MinaMora.

### Mention Magazinally

Marian Hubler and Marc Kasky & all the folks at Fort Mason.

Everybody else: Goldie Rush, Danica Remy, Carla Sameth and John Norris (Doorpersons R Us), Eileen Law, Dena Wade (who smiled in the face of adversity).

And Christopher Lofaro for blood, sweat and tears.

#### pARTY/SCIENCE/

#### The Be Room Participants

##### Installations:

M. S. Hove: Body Artist/  
Black Skin Painting.

Rick Livingston: Sculptor/  
3-D Puppet Creatures.

Diane Fenster: Photographer/  
Computer-Assisted Photography.

Karl X. Hauser: Sculptor/Neon Art.

Jim Petrillo: Designer/  
Interactive Digital Media.

Chris Van Raalte/Ed Severinghaus:  
The Body Synth, body-worn MIDI  
sound controllers.

##### Musicians:

Doug "Satchmo" Weiselman:  
Baritone Sax.

J. Raoul Brody: Laconic Accordion.

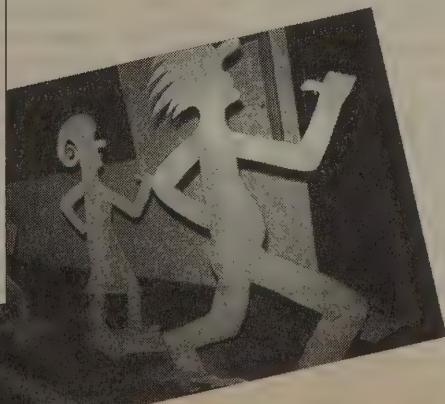
Stephen "Tuberius the Drone" Kent:  
Didgeridoo.

##### Curators:

Joegh Bullock & Mark "Spoonman"  
Petrakis, pARTY/SCIENCE.

—Jon McIntire

Kathleen O'Neill



R. We Really's  
Nuclear Family.

## BACKSCATTER

Echoes from readers back to *Whole Earth Review* (27 Gate Five Road, Sausalito, California 94965).

We pay \$15 for every letter we publish.

### Slouching toward Los Alamos

Robert Naisbet has said, "It is impossible to escape the melancholy conclusion that man's belief in himself has become weakest in the very age when his control of the environment is greatest." It is clear from Steven Levy's interview ("A-Life Nightmare," #76:36) that the [Los Alamos a-life] researchers are wrestling with this critical issue; and, while they and other a-life researchers do not have the "answers," they are ready to confront these issues and, in some instances, are ready to accept the fact that the transformational successor to humans may not have the same biological form which we have come to know and love.

The interviews make one believe that Levy is having a great deal of difficulty accepting that the a-life community has such a positive attitude toward such a transformation while maintaining a significantly humanistic and humane perspective on life. Try as he might, Levy is unable to raise an iota of self-doubt, resignation or fear. Even raising the spectre of past debacles such as nuclear power does not lead one to believe that any of these researchers has any cause to doubt the ability of the larger a-life community to willingly precipitate this transformation and take full responsibility.

The entire genre of cyberpunk (Gibson's *Neuromancer*, for example) may, philosophically, be much closer to this vision of complex dynamics and a-life than the more colorful arena of virtual reality. Decking may be only a microstep from some of the bionic capabilities which we are developing today as nanotechnology gains currency. Similarly, learning by non-sentient computers as exemplified by Rodney Brookes starts us wondering about R2D2 and C3PO (but do our children even question this?).

Thus, sooner than we expected, we may need to consider the definition of life as postulated by Farmer and d'A. Belin,

mentioned in passing by Levy and worth summarizing here:

- Life is a pattern in spacetime — recall that our cells are replaced many times in a life.
- Self-reproduction
- Information storage of a self-representation
- A metabolism
- Functional interactions with the environment
- Interdependence of parts
- Stability under perturbations
- The ability to evolve

Given the research in nanotechnology and biotechnology coupled with the growth in the a-life computer community, complex dynamics and virtual reality, I believe that science has underestimated the time we have until one must indeed confront the issue of whether an entity is "alive" in the legal, social or moral sense.

The systems philosopher Erwin Laszlo has said that Nature took her greatest gamble when she created humans. Intelligence is no guarantee of evolutionary success.

Tom P. Abeles, Ph.D.  
Minneapolis, Minnesota

### Bring me a cool drink of water 'fore I replicate, oh lawdy

The a-life advocates perhaps should take a deep breath before making the case that their computer codes actually are alive. I work at a computer company whose products are used primarily for simulation, or modeling, in scientific research and engineering. My work has sensitized me to keeping in mind the distinction between physical objects and processes on the one hand and on the other the computational models of objects and processes that scientists and engineers find so useful. It's easy to get lax with language and mix the categories in casual conversation, but in the interests of staying in touch with reality, we ought to avoid this habit. . . .

It also is a leap of faith to say that, because the models mimic living organisms, living organisms operate according to the rules that govern the models. . . . Keith Gunderson summed up this point in his excellent book, *Mentality and Machines*: "In the end the steam drill outlasted John Henry as a digger of railway tunnels, but that didn't prove the machine had muscles; it proved that muscles were not

needed for digging railway tunnels." When computer codes reproduce, grow, and adapt it doesn't prove that they are alive, it may prove merely that life is not necessary for reproduction, growth, and adaptation.

Ken Jopp  
Saint Paul, Minnesota

### Repetition breeds discipline

I find it rather amazing that you would publish a story on the greening of the armed forces ["Army Green," #76:58] without any mention of Gene Keyes' similar article back in Summer '82 of *CoEvolution Quarterly*. How quickly we forget! Was someone asleep at the computer terminal?

Not only that, but just as Desert Shield was being deployed, the Defense & the Environment Initiative conference was held in Washington, attended by both hundreds of Pentagon brass and citizens organizations. The proceedings are available at the Environmental Affairs Division.

War is hell, but in peace time the military has always been there to assist in emergencies. During a Congressional Investigation on the state of the biosphere four star generals stood up and declared that the environment was a matter of national security. General Schwarzkopf when asked during a Barbara Walters interview what he wanted to do now that he had retired replied he wanted to champion environmental causes!!! This is nothing new.

Brigadier General Michael Harbottle, former chief of staff of United Nations Peace Keeping Forces, has been keeping track of environmental activities on the part of armed forces in every nation on Earth. It's published by the Centre for International Peacebuilding in Oxon, England.

And worse of all, you forgot the gran'daddy of 'em all, the First Earth Battalion, a new age army concept seeded during the Carter administration, shamelessly ripped off and turned into "caca" by CBS/Paramount's exceptionally short lived Earth Force. They had even dared to call the working title "Green Machine" which is slang for the US Army. One call put a stop to it!

Why when *Whole Earth* usually does such a phenomenal job of in depth re-

search did this piece dismiss the "real" movement afoot to do just what it is your piece advocates? Doug Moss at *E* magazine did the same mistake a few months ago in one of his editorials. I don't get it! Is this aspect of the environmental community so guilty of the fish bowl effect that it can't see past its own narrow view anymore? It's time for a cold shower guys and a fresh outlook. There's a world outside the window, OK?

Remy Chevalier  
Weston, Connecticut

## What good is half an argument?

Kevin Kelly says [in "Deep Evolution," #76:4]: "The main problem with Darwinian theory is that it is unproven" and that Darwin could not offer "any provable mechanism by which . . . natural selection could take place." Both these comments are true — and true of every other scientific theory as well. The job of scientists is not to create theories that can be proven true (for how could you do that anyway?) but to create theories that could, by their nature, be *disproven*. This distinction is not splitting hairs: it's the difference between saying "Here is the truth about the world" and "here is the best description of it we can currently make."

The second point I'd like to make is this: it seems to me a little bit sneaky to have a large bibliography of books (some of rather dubious scholarship) that support the point of view which Kevin is presenting, but not to mention the two books which most brilliantly and articulately *defend* Darwinism. I refer, of course, to *The Selfish Gene* and *The Blind Watchmaker*, both by Richard Dawkins. It may turn out that Dawkins' staunchly neodarwinist position is wrong, but, in the meantime, to conduct this discussion without reference to him is to miss half the fun of the party. By brilliantly parrying many of the attacks against conventional Darwinism, he clarifies the discussion.

Just to give one example: Kevin invokes the popular dismissal of Darwinism based on the question "what good would half an eye be?". This question is meant to make you think that eyes *couldn't* have evolved slowly because an incomplete (i.e. 'still evolving') eye would have no useful survival value. Dawkins' answer to the question is: "It's a lot better than no eye at all!" Like many of his perceptions,

this is striking, simple and clear. I personally welcome this clarity, and think that a strong and original defence of an orthodox theory is as useful and as interesting as a new theory.

Brian Eno  
London, England

## Army Greenwashing

Whose press releases has Stewart Brand been absorbing? "Army Green" (#76:58) caught my eye as I leafed through your pages at the newsstand and I thought, "Oh goody, some more dialogue on military conversion." Curled up at home I was ready for some preaching to the converted when lo and behold it's Stewart Brand who is converted. I nearly stopped after the first paragraph. "The arms race is running backwards"? If the arms race is running backwards why is Bush selling or giving away weapons at breakneck pace? F-16s to Taiwan, F-15s to Saudi Arabia, 850 million dollars in helicopters, missiles and munitions to Israel. And " . . . a dazzling victory in the Gulf"? A victory over what or whom? A tyrant we supplied with weaponry who remains in power after he invaded a repressive monarchy? Dazzling indeed. But "dazzling" isn't the end. It was "a lower-casualty victory with smart weapons in the Gulf". Smart enough to rain terror on tens of thousands of civilians while missing significant portions of intended targets and to have several in the US military killed by "friendly fire". The conversion of the military must be broad and swift. Not conversion while kowtowing to and maintaining the Pentagon elite, but conversion to *other* programs. Maintenance of a defensive posture and visible means to that end do not give us the right to be the world's weapons emporium. Sterile discussions of regional balance of power and diplomatic maneuvers based in weapons sales go on as if these pieces of hardware didn't actually kill people and destroy ecosystems. Stop cleansing the role of military. It plays off our lowest common denominators of fear and hate. Deliver tractors, not missiles; plumbing, not rifles; and seeds, not bullets.

Yes, the people and resources now used by the Pentagon could be and most certainly should be used for "the mostly gentle role of environmental steward." But don't disinfect past and present actions of the Pentagon and weapons

producers in order to gain a bargaining foothold. Forgive past roles and halt present escalations.

Brian Lehman  
San Rafael, California

## Barbaric health services make Americans tough!

As a low-income Canadian I found Phil Catalfo's description of medical payments [in "Under Siege," #75:10] shocking, outrageous and frightening. What some Americans may not know is that during Free Trade negotiations between Canada and the US, it has been suggested that Canadian government-assisted Medicare is an 'unfair subsidy' hence our system is under threat of being eroded to match the current (forgive me for saying so) barbaric system in the US.

Americans lobbying for a universal health care system also helps Canadians retain ours. In solidarity,

Janis Bowley  
Vancouver, British Columbia

## . . . And let typesetters be feared and venerated

The Winter '91 issue (Questioning Technology) brought to mind this verse from the *Tao Te Ching*:

Let nations be small with small populations.  
Let machines multiply, doing the work of many,  
But let the people have no use for them.  
Let the people mind death and not migrate.  
Let there be boats and carriages,  
But let the people have no use for them.  
Let there be weapons and armour,  
But let the people have no use for them.  
Let knotting cords replace writing.  
Let the food be plain,  
Let the cloth be simple,  
Let the dwellings be modest.  
Though they live in sight of each other,  
And hear the cocks crowing,  
the dogs barking,  
They will grow old and die,  
Leaving one another alone.

It is believed that Lao-Tzu, the author, may have lived about the same time as Confucius: 551-479 B.C.E. This trans-

lation was published by Concord Grove Press, 1983; the translator is not identified.

Denise Downie  
Atascadero, California

## They probably go direct to the Secret Postal Police

I just noticed Edward Bertsch's letter [Backscatter, #74:125] about his failed experiment mailing a 1¢ postcard to a politician under a printed "First Amendment Class Mail" card.

Well, since reading "The Stamp Act" I have probably mailed over forty cards for 1¢ each and none have come back. Most have gotten responses, so I know they're getting through. I don't just send them to WA D.C. — Some go to City Halls and Sacramento.

Maybe you could attribute the divergent experiences of myself & Ed to the alertness of Pasadena employees not being up to Minnesota snuff.

C. W. Scott Rubel  
Pasadena, California

## The virtual privy

Last week I was enjoying a nice breakfast with my good friend Ernesto, when the discussion moved to a discussion of Will Baker's reportage on Tantamount Reading [#76:116], a modern computer technology which evokes the "American archetype" of reading a good book without the bother of "really reading." Ernesto was impressed with Guilder & Jones's research on "reading enhancers" and the "urban cafe" reading environment, but felt that our remote New England villages require a more culturally sensitive (e.g. "quaint") technology appropriate to the American standards of this bioregion.

Following in the footsteps of Herman Melville, Henry David Thoreau, and Louisa May Alcott (so to speak), we Yankees traditionally process the bulk of our serious thinking and reading in the outhouse. Can those TR boys work up an enhanced "backwoods shitter" reading environment? Something where the intrepid farmer/dump picker could plumb together a few solar panels, tractor battery, Nintendo, modified porcelain appliances, etc. to evoke the unique ambience of "Mother Nature's reading room": a few buzzing flies, extraneous smells, bird-

calls, stray sawdust between the pages of a wrinkled old *CoEvolution Quarterly*, perhaps a randomized "out of paper" feature (suggesting a new use for the "electronic diptych").

This would be the true historical American reading archetype. But much more pleasant than having to trudge outside in the snow on some frigid January morning! Various "Throne Accessories" could include a "Little Engine that Could" Tantamount toilet training, a good assortment of Tantamount old *Playboys* and garden-seed catalogs, and Tantamount Ex-lax-lit-ware ("Old Faithful Tourist brochure," *The Shining*, etc.).

Stephen G. Brown  
Durham, New Hampshire

Would require five or six trapped, unhappy wasps for 100% verisimilitude. —Ed.

## That's why they call it Balkanization

Recent events in Eastern Europe reminded me that the *CoEv Quarterly* produced a map and article around 1984 predicting the dissolution of Europe into discrete cultural states. I can't find the article in my back issues [It was in *CQ* #32, inside front cover], but I recall it as arguing this was the wave of the future and basically a good thing. (Maybe that memory is colored by my own prejudices; I know that at the time I considered a Romantically Anarchic good idea.) The map shows the western part of Europe splitting and not where the breakdown of large states to small actually has occurred.

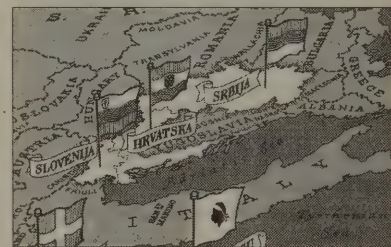
So ok, it didn't happen in Western Europe (maybe there was a myopic vision of that commie area as Not Europe), and it may not have been a Good Thing, but it did happen. Overall, that was not a

bad call.

And maybe it's time for another look at the concept. Maybe Community as Nation is not such a purely good idea. If my cultural community is surrounded by your hostile cultural community, and your community doesn't want us there, in fact would rather we were dead, maybe the idea of a larger, dominating central state keeping us all under control might not sound so bad to me. I only know what I get from the papers and NPR, but the slaughters in Bosnia, Moldavia, Armenia, et al., seem to be rooted in shared cultural, historic senses of community that were suppressed and hidden for just a brief time, just long enough for those not directly involved to forget. It may be community in psychosis, but there it is. I don't pretend to understand these terrible events, but I know I would hate to be murdered by someone else's shared cultural values.

Please don't take this as a plea for a return to Stalinism. But maybe it would be good for *WER* to take a look at the darker side of small, localized politics. Here in my native state public education is in a very bad way, and the *LA Times* writes about avant-garde Riot Proof Architecture. That's a tenuous connection to make, but I believe a connection is there. Maybe I'm just talking about racism.

Steven Hanks  
San Francisco, California



## Arfdates & Grr-rections

From *WER* #76 (Fall 1992):

The new ordering address for *Amplified Harmonica Playing Made Possible* (p. 119) is: 22 Union Street, New Brunswick, ME 04011.

The correct address for NOSAD (National Organization for Seasonal Affective Disorder) (p. 106) is P. O. Box 40133, Washington, DC 20016. This is also the right address for ordering *Seasons of the Mind* (same page), which is "temporarily out of print."

The Fold-A-Tube (p. 115) is \$4 postpaid

for 2 (minimum order); each additional Fold-A-Tube is \$1.

From *WER* #75 (Summer 1992):

Maria von Bolschwing's Huichol Art Center (p. 48) is now at 493 Bridgeway, Sausalito, CA 94965.

"Feminism in Jewish Spirituality" (p. 76) is illustrated with a sculpture of Miriam that should have been credited to the artist, Ann Froman, rather than to the book *Miriam's Well*. Froman can be reached at Froman Studios, Stan-fordville, NY 12581. ☺



## Point Foundation Financial Report

<b>Balance Sheet</b>		
	as of March 31, 1992	as of June 30, 1992
<b>Assets</b>		
Cash	69,955.47	45,731.59
Accounts Receivable	85,919.05	75,256.12
Inventory	1,575.00	1,575.00
Fixed Assets Less Depreciation	17,621.13	17,256.93
Other Assets	40,276.10	39,875.10
<b>Total Assets</b>	<b>215,346.75</b>	<b>179,694.74</b>
<b>Liabilities</b>		
Accounts and Contracts Payable	68,983.20	72,557.70
Subscription Liability	516,741.00	494,440.00
<b>Total Liabilities</b>	<b>585,724.20</b>	<b>566,997.70</b>
<b>Fund Balance</b>	<b>-370,377.45</b>	<b>-387,302.96</b>

<b>Income &amp; Expenses</b>		
	1st Qtr 1992	2nd Qtr 1992
<b>Income</b>		
Subscription Income	122,855.39	116,558.22
Back Issue & Single Copy Sales	4,322.94	2,434.53
Newsstand Sales (after Returns)	43,973.88	51,212.32
Book & Product Sales	5,205.73	2,706.83
Royalties	1,729.91	346.08
List Rental	2,661.14	2,035.17
Unclassifieds	3,499.00	2,792.50
Contributions	4,533.00	4,228.00
Other Income	1,548.44	411.85
<b>Total Income</b>	<b>190,329.43</b>	<b>182,725.50</b>
<b>Expenses</b>		
Payroll & Related Expenses	90,493.43	103,172.43
Printing WER	29,337.60	26,662.46
Writers & Illustrators	5,305.00	8,345.00
Editorial/Production Expenses	4,043.75	471.90
Fulfillment/Promotion Expenses	25,914.33	24,805.01
Newsstand Expenses	5,913.51	6,787.59
Book & Product Sales Expenses	3,303.38	3,961.68
Rent, Maintenance & Utilities	13,750.82	12,869.40
Insurance & Taxes	221.50	1,262.50
Office & Computer Supplies	4,669.71	4,432.02
Depreciation	1,840.00	1,968.00
Postage & Phone	3,683.20	3,489.42
Other Expenses	227.55	1,570.35
<b>Total Expenses</b>	<b>188,703.78</b>	<b>199,797.76</b>
<b>Net Change in Fund Balance</b>	<b>1,625.65</b>	<b>-17,072.26</b>

With this issue we return to the practice of publishing our quarterly Financial Report in each issue (two quarters this issue, to catch up). Our Spring issue will include a report for the entirety of the previous year.

The disclaimer: These reports are for informative purposes only and should not be seen as an Official Financial Statement.

With this issue we also begin reporting on our subscription orders so that you can have some idea of the sources for WER subscribers. —Keith Jordan

<b>Subscription Orders</b>		
	1st Qtr 1992	2nd Qtr 1992
<b>New Subscriptions</b>		
Inserts in Newsstand Copies	575	404
Inserts in Subscriber Copies	278	212
Gift Subscriptions	447	126
Institutions	36	17
Other Sources	218	170
Less Unpaid Bill-me Orders	-119	-86
<b>Total New Subscriptions</b>	<b>1,435</b>	<b>843</b>
<b>Renewal Subscriptions</b>		
Institutions	471	158
Gift Renewals	119	93
Conversions *	553	427
Regular Renewals *	1,424	1,571
Less Unpaid Bill-me Orders	-63	-63
<b>Total Renewals</b>	<b>2,504</b>	<b>2,186</b>
<b>Total Subscriptions</b>	<b>3,939</b>	<b>3,029</b>

\* Conversions are people renewing their own subscription for the first time, Regular Renewals are people renewing their own subscription for the second time or more.

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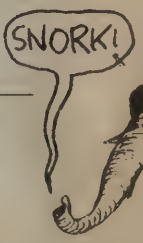
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a. Total No. Copies (Net Press Run)	56,204	56,545
b. Paid and/or Requested Circulation	14,394	14,853
c. Sales Through Dealers and Carriers, Street Vendors and Counter Sales (Paid and/or Requested)	22,940	22,961
d. Paid Distribution Outside the U.S.	37,374	37,814
e. Paid Distribution in U.S.	1,025	900
f. Total Paid Distribution	38,399	38,714
g. Copies Not Distributed (Office use, left-overs, unsold, returned, spoiled, other printing)	2,051	1,879
h. Return from News Agents	15,754	15,952
i. Total, Item 11, f and g - should equal net press run shown in 10a	56,204	56,545

11. I certify that the statements made by me above are correct and complete.  
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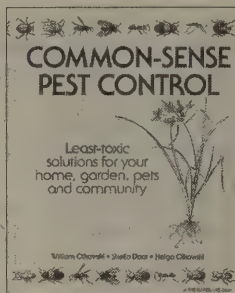
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## Cohousing: A Contemporary Approach to Housing Ourselves

Kathryn McCamant and Charles Durrett

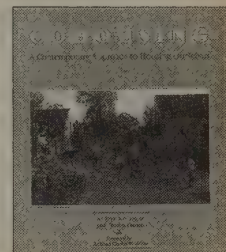
A beautiful book that has inspired many of the cohousing projects built or planned in the US.

Anyone investigating housing alternatives will find this book an inspiring resource. It introduces the concept; provides an insider's view of life in eight Danish communities; and examines the mechanics and design of developing cohousing.

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1988. Softcover, 208 pages with bibliography and index.

\$22



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Steven Levy

A-life holds the promise of helping us to understand the path of evolution or to engineer new virus-killing molecules. But it may also lead to the creation of artificial offspring that could evolve beyond our ability to control them.

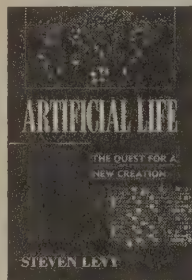
*"Humans ought to make the decision to create or not create possible successors before we lose control of the process we started. To talk intelligently about where*

*a new technology might lead, we have to understand what it is."*

—Howard Rheingold (WER #75)

1992. Hardcover, 390 pages, with index and 11 color plates.

\$25



## Alternative Energy Sourcebook — 7th Edition (The Complete Resource for Energy-Independent Living)

Edited by John Schaeffer, Real Goods Trading Corporation

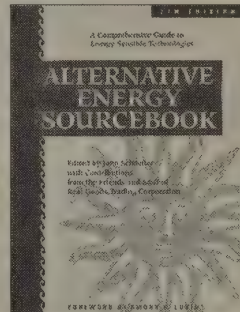
This is more than just a Sears catalog for people seeking energy-sensible technologies. In addition to selling hard-to-find stuff at good prices, it provides honest recommendations and solid information.

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1992. Softcover, 518 pages, with indexes.

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## The World of Zines

(A Guide to the Independent Magazine Revolution)

Mike Gunderloy and Cari Goldberg Janice, editors of Factsheet Five

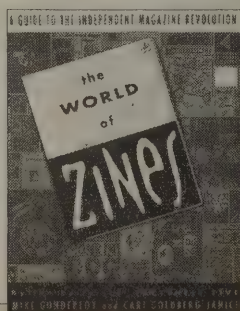
Whole Earth Review has regularly featured Mike and Cari's gleanings from the more than 10,000 small magazines — "zines" — being published today in the US. They have chronicled these publications in the pages of *Factsheet Five*.

*The World of Zines* provides a window on the zine world with information that includes:

- a directory of 400 of the most interesting and unusual zines available today;
- a history of zine publishing;
- how to publish your own zine.

1992. Softcover, 224 pages.

\$14



## Ecological Literacy: Education and the Transition to a Postmodern World

David Orr

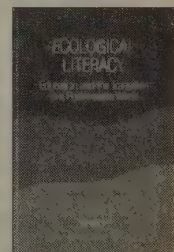
Educational institutions represent a major and largely ignored leverage point to move us toward sustainability.

In this collection of fifteen essays, Orr clarifies the concepts and implications of sustainability; examines the essential role of education in solving the ecological crisis; proposes a syllabus for ecological literacy; and critiques established research agendas and curricula.

*"I consider this to be the most important book I've reviewed in years."* —J. Baldwin (WER #77)

1992. Softcover, with notes and index. 210 pages.

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## Explorabook

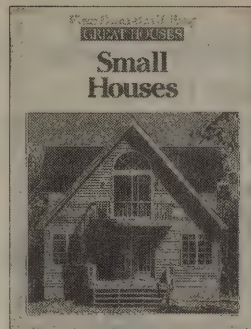
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Fine Homebuilding

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Ken Kesey

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Notes from *Sailor Song* appeared in *WER(CQ)* #37.

1992. 533 pages. \$24



## Shelter

Edited by Lloyd Kahn

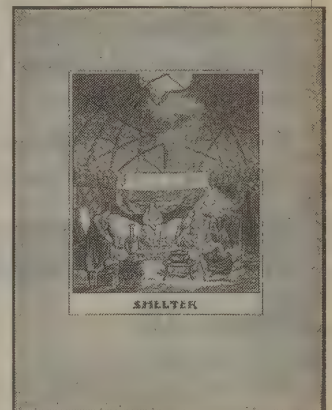
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Christopher Alexander, et al.

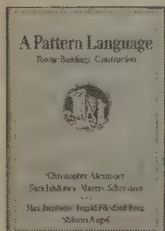
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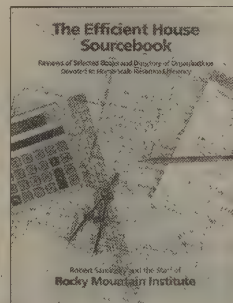
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Robert Sardinsky and the Rocky Mountain Institute

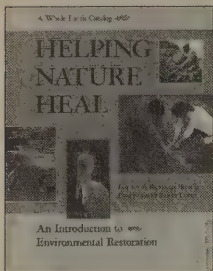


Many of the best resource-efficient building technologies in use today did not exist a year ago. This annotated 1992 directory of periodicals, books, and helpful organizations will help you identify and make the most of the "latest and greatest" household resource-efficiency opportunities that exist for you, no matter where you live.

"Where to find just about anything you need or need to know about resource-efficient housing is in here. It's where I look first." —J. Baldwin

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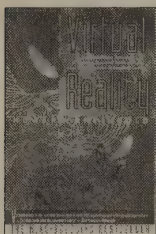
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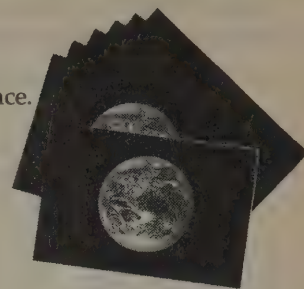
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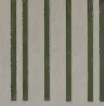
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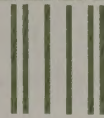
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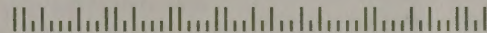
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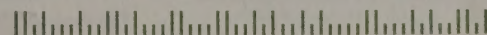
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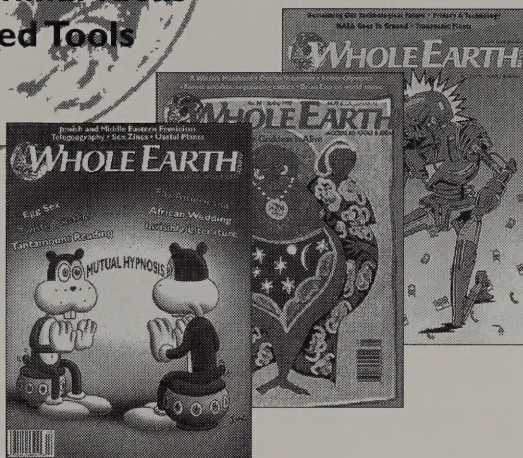


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**74. Spring 1992** — The Goddess Is Alive: women's wisdom from Z Budapest and Paula Gunn Allen; reviews of pagan zines; reflections of an outlaw volunteer; fighting for the forests: negotiating tactics, tools and resources for forest activists; robot Olympics; Brian Eno on world music; the coevolution of governance; reviews of maps and atlases. **\$7.**

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**70. Spring 1991** — A nationwide information and communication network; access to political tools and to poetry; the Gesundheit Institute; do-it-yourself eclipse prediction, by William Calvin; Cyberthon 1.0. Plus Wavy Gravy, Will Baker, Robert Bly, Gore Vidal. **\$7.**

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Otto Hagel, 1938